As confidentially submitted to the Securities and Exchange Commission on October 19, 2018

Registration No. 333-

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

Precision BioSciences, Inc.
(Exact name of registrant as specified in its charter)

Delaware	2836	20-4206017
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

302 East Pettigrew St., Suite A-100
Durham, North Carolina 27701
(919) 314-5512
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

Matthew Kane
President and Chief Executive Officer
Precision BioSciences, Inc.
302 East Pettigrew St., Suite A-100
Durham, North Carolina 27701
(919) 314-5512
(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copies to:

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Approximate date of commencement of proposed sale to the public:
As soon as practicable after this Registration Statement is declared effective.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933 check the following box: ☐

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☐
Non-accelerated filer	☒	Smaller reporting company	☐
		Emerging growth company	☒

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of the Securities Act ☐

CALCULATION OF REGISTRATION FEE

Title of each class of securities to be registered	Proposed maximum aggregate offering price(1)	Amount of registration fee(2)
Common Stock, $0.000005 par value per share	$	$

(1) Estimated solely for the purpose of calculating the registration fee in accordance with Rule 457(o) under the Securities Act of 1933. Includes the aggregate offering price of additional shares that the underwriters have the option to purchase.

(2) Calculated pursuant to Rule 457(o) based on an estimate of the proposed maximum aggregate offering price.

The registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the registrant shall file a further amendment that specifically states that this registration statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933, as amended, or until the registration statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

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The information in this preliminary prospectus is not complete and may be changed. We may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This preliminary prospectus is not an offer to sell these securities and is not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

Subject to Completion, dated , 2019

Preliminary prospectus

shares

PRECISION BIOSCIENCES

Common stock

This is an initial public offering of shares of common stock by Precision BioSciences, Inc. We are offering shares of our common stock. The initial public offering price is expected to be between $ and $ per share.

Prior to this offering, there has been no public market for our common stock. We intend to apply to list our common stock on The Nasdaq Global Market under the symbol " ."

We are an "emerging growth company" under the federal securities laws and are subject to reduced public company reporting requirements for this prospectus and future filings.

	Per share	Total
Initial public offering price	$	$
Underwriting discounts and commissions(1)	$	$
Proceeds to Precision BioSciences, Inc., before expenses	$	$

(1) See "Underwriting" for a description of compensation payable to the underwriters.

We have granted the underwriters an option for a period of 30 days to purchase up to additional shares of our common stock.

Investing in our common stock involves a high degree of risk. See "Risk factors" beginning on page 11 of this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

The underwriters expect to deliver the shares of commons stock to purchasers on or about , 2019.

J.P. Morgan **Goldman Sachs & Co. LLC** **Jefferies** **Barclays**

, 2019.

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Neither we nor the underwriters have authorized anyone to provide any information or to make any representations other than those contained in this prospectus or in any free writing prospectus prepared by or on behalf of us or to which we have referred you. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. This prospectus is an offer to sell only the shares offered hereby, but only under circumstances and in jurisdictions where it is lawful to do so. The information contained in this prospectus or in any applicable free writing prospectus is current only as of its date, regardless of its time of delivery or any sale of shares of our common stock. Our business, financial condition, results of operations and prospects may have changed since that date.

Through and including , 2019 (the 25th day after the date of this prospectus) all dealers that effect transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This is in addition to the dealers' obligation to deliver a prospectus when acting as underwriters and with respect to their unsold allotments or subscriptions.

We have proprietary rights to trademarks, trade names and service marks appearing in this prospectus that are important to our business. Solely for convenience, the trademarks, trade names and service marks may appear in this prospectus without the ® and ™ symbols, but any such references are not intended to indicate, in any way, that we forgo or will not assert, to the fullest extent under applicable law, our rights or the rights of the applicable licensors to these trademarks, trade names and service marks. All trademarks, trade names and service marks appearing in this prospectus are the property of their respective owners.

For investors outside the United States: Neither we nor the underwriters have done anything that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than in the United States. Persons outside the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the offering of the shares of common stock and the distribution of this prospectus outside the United States.

Prospectus summary

This summary highlights selected information contained in greater detail elsewhere in this prospectus. This summary does not contain all of the information you should consider before investing in our common stock. You should read this entire prospectus carefully, especially the risks of investing in our common stock discussed under "Risk factors" and our financial statements and the related notes thereto included at the end of this prospectus, before making an investment decision. As used in this prospectus, unless the context otherwise requires, references to "we," "us," "our," "the Company" and "Precision" refer to Precision BioSciences, Inc. and its subsidiaries on a consolidated basis.

Overview

We are a leading genome editing company dedicated to improving life. We have developed a groundbreaking proprietary genome editing platform to treat human diseases and create healthy and sustainable food and agricultural solutions: we call this platform "ARCUS." The versatility and breadth of ARCUS support our ability to develop product platforms in a variety of applications. We are initially focusing on three innovative and high value areas where we believe our technology addresses the limitations of other genome editing technologies: cancer immunotherapy (allogeneic CAR T cells), *in vivo* gene corrections and food and agriculture. We expect to commence a Phase 1/2a clinical trial with our lead gene-edited allogeneic CAR T cell candidate targeting CD19 in the first quarter of 2019. We believe our team, whom we call Precisioneers, has the deepest scientific experience and capabilities of all genome editing companies.

Our genome editing platform—ARCUS

Genome editing is a biotechnology process that removes, inserts or repairs a portion of DNA at a specific location in a cell's genome. Our proprietary genome editing platform, ARCUS, is a collection of protein engineering methods that were developed specifically to re-program the DNA recognition properties of I-CreI. In nature, I-CreI is an endonuclease found in the genome of algae, *Chlamydomonas reinhardtii*, which evolved for the purpose of carrying out a complex gene insertion edit. I-CreI is responsible for modifying a specific location in the algae's genome by inserting a gene using a very precise cellular repair mechanism called homology directed repair, or HDR.

We believe I-CreI has a number of attributes that are beneficial for genome editing applications, such as:

- **Specificity**. Complex applications of genome editing technology, especially those involving the human body, require a very high level of endonuclease specificity to limit the likelihood that the endonuclease will recognize and cut any genetic sequence other than its intended target. I-CreI recognizes and cuts a DNA sequence that is 22 base pairs in length through a large number of complex molecular interactions with the bases. I-CreI physically couples the functions of DNA binding with DNA cutting, and acts through a slow catalytic mechanism and low turnover rate, remaining inactive in the absence of its DNA target site.
- **Efficiency**. Most applications of genome editing technology require that a sufficient portion of the targeted cells are edited to achieve the desired result. The activity level of the endonuclease is one factor that can affect how many cells are edited. Given its slow catalytic activity, I-CreI is able to achieve a high level of on-target editing while rarely cutting off-target.
- **Delivery**. Size and structural simplicity affect the ease with which endonucleases can be delivered to cells for editing. I-CreI is very small relative to other genome editing endonucleases. As such, it is compatible with many different delivery mechanisms, and its small size and simple structure facilitate the simultaneous delivery of multiple engineered endonucleases to introduce more than one edit to a cell. Both of these

properties significantly broaden the spectrum of potential applications for I-CreI-based genome editing endonucleases.

- **Type of cut**. I-CreI creates four base 3' overhangs when it cuts its DNA site, which increases the likelihood that the cell will repair the DNA cut through HDR. HDR is a mechanism of DNA repair whereby the cell uses a second DNA molecule with a sequence similar to that of the cut DNA molecule to guide the repair process. Since HDR uses a template of similar genetic information to guide the repair process, it is the more precise mechanism of cellular repair compared to the other mechanism, non-homologous end joining, or NHEJ, which prioritizes speed over accuracy, making it prone to leaving insertions and/or deletions of DNA bases at the cut site. As such, the DNA cuts created by I-CreI can be exploited to efficiently insert or repair DNA as well as delete DNA.
- **Programmability**. I-CreI recognizes its DNA target site through a complex network of contacts between the endonuclease and the DNA bases which makes the enzyme very challenging to re-program for new editing applications involving different DNA sequences. This engineering challenge represents a very high barrier to entry and has enabled us to secure a strong intellectual property position and control over what we believe to be a superior genome editing technology.

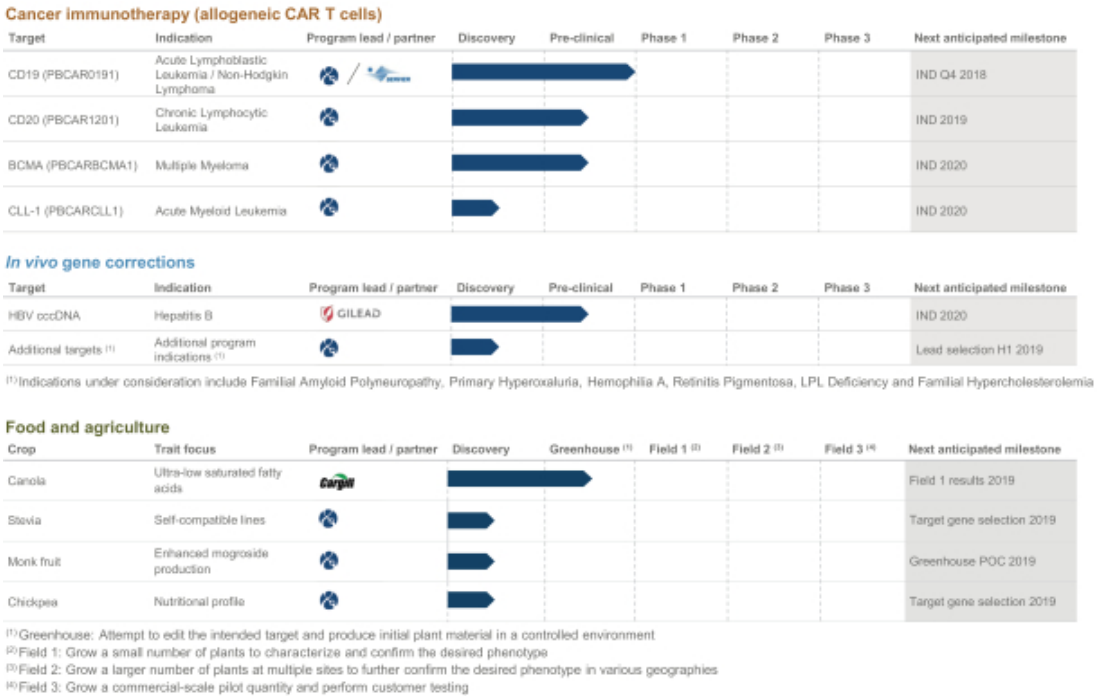
To apply I-CreI to genome editing in other cells or organisms, we must modify it to recognize and cut a different DNA sequence for each new application we pursue. Since the I-CreI endonuclease evolved to recognize its target sequence in the algae genome with a very high degree of selectivity, it is difficult to re-design it to bind and cut a different DNA sequence. Using the ARCUS process, we create customized endonucleases for particular applications. We call these custom endonucleases "ARCUS nucleases."

We are able to redirect the ARCUS nucleases to a new location in a genome without compromising its editing abilities. In addition to changing the parts of the enzyme involved in recognizing a target DNA site, we can modify the active site of the enzyme and parts of the enzyme involved in anchoring it to the DNA. These modifications allow us to control how tightly the enzyme binds to DNA or how quickly it cuts, both of which play an important role in determining the efficiency with which the endonuclease cuts its intended target site or any potential off-target sites.

We believe ARCUS nucleases are the smallest and easiest to deliver genome editing endonucleases. Like I-CreI, ARCUS nucleases produce DNA cuts with 3' overhangs that promote HDR, facilitating gene insertions and gene repairs in addition to gene knockouts. We believe that these attributes will enable us to translate ARCUS into a wide array of products that have the potential to address the limitations of other genome editing technologies and improve life.

Our product platforms

We leverage ARCUS to build platforms designed to rapidly generate new products in a given field. We are currently developing products from three such platforms: cancer immunotherapy (allogeneic CAR T cells), *in vivo* gene corrections, and food and agriculture.



Cancer immunotherapy (allogeneic CAR T cells). We believe that we have developed the world's leading allogeneic gene-edited CAR T cell platform with the potential to overcome certain limitations of autologous CAR T cell therapies and significantly increase patient access to these cutting-edge treatments. The allogeneic approach involves the use of donor-derived cells which can be selected using specific criteria to define "healthy" T cells. We expect the allogeneic approach will lessen the product-to-product variability seen in autologous therapies, which are derived from the patient's own cells. Additionally, donor-derived cells could be used in any patient, eliminating the "one patient: one product" burden of autologous CAR T cell therapies. We are also initially developing product candidates for well-validated CAR T cell targets. Our most advanced program, PBCAR0191, is an allogeneic CAR T cell therapy targeting the well-validated tumor target CD19 and being developed for Acute Lymphoblastic Leukemia, or ALL, and Non-Hodgkin Lymphoma, or NHL. In February 2016, we entered into an agreement with Les Laboratories Servier, or Servier and we have agreed to develop allogeneic CAR T cell therapies for up to six unique antigen targets selected by Servier, one of these antigen targets is CD19. We submitted an IND for PBCAR0191 to the U.S. Food and Drug Administration in October 2018. We have used the qualities of ARCUS to create a one-step cell engineering process for allogeneic CAR T cells that we believe will rapidly yield a consistent cell product at a significantly lower cost than autologous CAR T cell therapies. Due to our one-step editing method and the decision early in the development of the platform to invest in process development, our manufacturing process today is scaled as opposed to scalable.

***In vivo* gene corrections.** Our goal is to cure genetic diseases by correcting the DNA errors responsible for causing them. We are advancing a deep portfolio of diverse programs toward *in vivo* efficacy and toxicity studies. We are generating a significant large animal dataset that we believe will be the most comprehensive of any in the field. The potential of ARCUS for *in vivo* genome editing is highlighted in our July 2018 publication in *Nature Biotechnology*, which we believe is the first peer-reviewed publication of *in vivo* genome editing data in non-human primates. The publication reported high-efficiency editing of the PCSK9 gene in non-human primates using ARCUS and, even at the highest dose, the treatment was observed to be well tolerated. Because this therapeutic effect is due to modifications to the DNA itself, the benefit of the treatment appears to be permanent. In September 2018, we announced a collaboration with Gilead Sciences Inc. to co-develop an ARCUS-based cure for chronic Hepatitis B infection.

Food and agriculture. This platform, which we operate through our wholly owned subsidiary, Elo Life Systems, or Elo, is an integrated suite of gene discovery and plant engineering technologies that allows us to generate pre-breeding material for food producers. We believe we have the most in-depth experience in crop genome editing in the industry. Over the last decade, we have developed highly efficient methods to improve delivery and functionality of ARCUS nucleases to edit DNA in plants. By combining the power of our ARCUS technology platform with target discovery, transformation and high throughput evaluation, we are enabling our partners to address emerging opportunities in food and agriculture. Our differentiated collaboration-based business model enables us to remain capital efficient throughout the product-development cycle while generating revenue through various revenue-sharing models. Since 2014, Elo and Cargill have been engaged in a collaboration to produce ARCUS-optimized canola varieties and have achieved significantly lower levels (less than 4.5%) of saturated fatty acids compared to the current levels (7%). These edited varieties are currently being evaluated in greenhouse and field trials.

Our strategy

Our goal is to broadly translate the potential of genome editing into permanent genetic solutions for significant unmet needs. Our strategy to achieve this goal includes the following key elements:

- Create a fully integrated genome editing company capable of delivering solutions that address unmet needs in human health.
- Accelerate advancement of our first four cancer immunotherapy product candidates.
- Advance *in vivo* genetic correction programs for the liver and eye.
- Build a human health-focused food business.
- Continue investing in the optimization of ARCUS and enabling technologies.
- Create an environment that is a destination of choice for premier talent within the life sciences industry.
- Expand the breadth of our operations through additional product platforms and strategic relationships.

Private financings

Since 2015, we have raised approximately $136 million in gross proceeds from preferred stock financings. Across these financings, we received investments from venBio, F-Prime, ArrowMark Partners, Franklin Templeton, Cowen Healthcare, Gilead, Brace Pharma, Portfax AgTech, OCV Partners, Adage Capital, RA Capital, Amgen Ventures, Vivo and Ridgeback Capital, among others.

Risks associated with our business

Our business is subject to a number of risks that you should be aware of before making an investment decision. You should carefully consider all of the information set forth in this prospectus and, in particular, should evaluate the specific factors set forth under “Risk factors” in deciding whether to invest in our common stock. Among these important risks are the following:

- We have incurred significant operating losses since our inception and expect to continue to incur losses for the foreseeable future. We have never been profitable, and may never achieve or maintain profitability.
- We will need substantial additional funding, and if we are unable to raise a sufficient amount of capital when needed on acceptable terms, or at all, we may be forced to delay, reduce or eliminate some or all of our research programs, product development activities and commercialization efforts.
- We have a limited operating history, which makes it difficult to evaluate our current business and future prospects and may increase the risk of your investment.
- ARCUS is a novel technology, making it difficult to predict the time, cost and potential success of product candidate development.
- The regulatory landscape that will apply to development of therapeutic product candidates by us or our collaborators is rigorous, complex, uncertain and subject to change, which could result in delays or termination of development of such product candidates or unexpected costs in obtaining regulatory approvals.
- Adverse public perception of genome editing may negatively impact the developmental progress or commercial success of potential products.
- Our research and development programs may not lead to the successful identification, development or commercialization of any potential products.
- Positive results, if any, obtained from early preclinical studies or clinical trials of our product candidates may not be predictive of results of later studies or trials, and failure to replicate positive results from early studies or clinical trials may inhibit our ability to further develop and commercialize product candidates.
- Clinical trials are difficult to design and implement, expensive, time-consuming and involve an uncertain outcome, and the inability to obtain regulatory approval for product candidates would substantially harm our business.
- If any of our product candidates do not work as intended or cause undesirable side effects, it could hinder or prevent receipt of regulatory approval or realization of commercial potential for them or our other product candidates and could substantially harm our business.
- Delays in completing our planned manufacturing facility or failure to achieve operating efficiencies from it may require us to devote additional resources and management time to manufacturing operations and may delay our product development timelines.
- Our ability to compete may decline if we do not adequately protect our proprietary rights, and our proprietary rights do not necessarily address all potential threats to our competitive advantage.
- Third parties may assert claims against us alleging infringement of their patents and proprietary rights, or we may need to become involved in lawsuits to defend or enforce our patents, either of which could prohibit our use of proprietary technology or sale of potential products or put our patents and other proprietary rights at risk.

Implications of being an emerging growth company

We are an "emerging growth company," as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. We will remain an emerging growth company until the earlier of (1) the last day of the fiscal year in which we have total annual gross revenue of $1.07 billion or more, (2) the last day of the fiscal year following the fifth anniversary of the date of the completion of this offering, (3) the date on which we have issued more than $1.0 billion in nonconvertible debt during the previous three years or (4) the date on which we are deemed to be a large accelerated filer under the rules of the Securities and Exchange Commission, or the SEC, which means the market value of our common shares that is held by non-affiliates exceeds $700 million as of the prior June 30th. For so long as we remain an emerging growth company, we are permitted and intend to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not emerging growth companies. These exemptions include:

- being permitted to present only two years of audited financial statements and only two years of related "Management's discussion and analysis of financial condition and results of operations" in this prospectus;
- not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended;
- not being required to comply with any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation or a supplement to the auditor's report providing additional information about the audit and the financial statements;
- reduced disclosure obligations regarding executive compensation in this prospectus and our periodic reports, proxy statements and registration statements; and
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

We have taken advantage of reduced reporting burdens in this prospectus and may elect to take advantage of other reduced reporting requirements in future filings. In particular, in this prospectus, we have provided only two years of audited financial statements and corresponding "Management's discussion and analysis of financial condition and results of operations" disclosure and have not included all of the executive compensation related information that would be required if we were not an emerging growth company.

In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This provision of the JOBS Act allows an emerging growth company to delay the adoption of these accounting standards until they would otherwise apply to private companies. We have elected to take advantage of this extended transition period.

Corporate information

We were incorporated in Delaware in January 2006. Our principal executive offices are located at 302 East Pettigrew St., Suite A-100, Durham, North Carolina 27701, and our telephone number is (919) 314-5512. Our website address is www.precisionbiosciences.com. The information contained in, or accessible through, our website does not constitute a part of this prospectus.

The offering

Common stock offered by us	shares
Common stock to be outstanding immediately after this offering	shares (or shares if the underwriters exercise their option to purchase additional shares in full).
Option to purchase additional shares	We have granted the underwriters a 30-day option to purchase up to additional shares of our common stock at the public offering price less the underwriting discounts and commissions.
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $ million (or approximately $ million if the underwriters exercise in full their option to purchase additional shares of common stock), at an assumed public offering price of $ per share, after deducting estimated underwriting discounts and commissions and the estimated offering expenses payable by us. We anticipate that we will use the net proceeds of this offering to advance and expand our clinical and preclinical development programs and for working capital and other general corporate purposes, which may include the costs of establishing a manufacturing facility. For a more complete description of our intended use of the proceeds from this offering, see “Use of proceeds.”
Risk factors	You should carefully read the “Risk factors” beginning on page 11 and the other information included in this prospectus for a discussion of factors you should consider carefully before deciding to invest in our common stock.
Proposed Nasdaq Global Market symbol	“ ”

The number of shares of our common stock to be outstanding after this offering is based on 81,390,126 shares of our common stock outstanding as of September 30, 2018, assuming the conversion of all outstanding shares of our convertible preferred stock into an aggregate of 47,606,095 shares of our common stock upon the closing of this offering, and excludes:

- shares of common stock issuable upon exercise of stock options outstanding under our 2006 Stock Incentive Plan, referred to as our 2006 Plan, and our 2015 Stock Incentive Plan, referred to as our 2015 Plan, in each case as of September 30, 2018, at a weighted-average exercise price of $ per share;
- shares of our common stock reserved for future issuance under our 2019 Incentive Award Plan, referred to as our 2019 Plan, which will become effective in connection with this offering, which number does not include any automatic increases in the number of shares of our common stock reserved for future issuance under our 2019 Plan; and
- shares of our common stock reserved for future issuance under our 2019 Employee Stock Purchase Plan, referred to as our 2019 ESPP, which will become effective in connection with this offering, which

number does not include any automatic increases in the number of shares of our common stock reserved for future issuance under our 2019 ESPP.

Unless otherwise indicated, this prospectus reflects and assumes the following:

- a -for- reverse stock split of our common stock, which will become effective prior to the effectiveness of the registration statement of which this prospectus forms a part;
- the automatic conversion of all outstanding shares of our convertible preferred stock outstanding as of September 30, 2018 into an aggregate of 47,606,095 shares of our common stock upon the closing of this offering;
- no exercise of outstanding options after September 30, 2018;
- the filing of our amended and restated certificate of incorporation, which will occur upon the closing of this offering; and
- no exercise by the underwriters of their option to purchase additional shares of our common stock.

Summary consolidated financial data

The following tables present a summary of our historical financial data for the periods ended on and as of the dates indicated. We have derived the summary consolidated statements of operations data for the years ended December 31, 2016 and 2017 and our summary consolidated balance sheet data as of December 31, 2017 from our audited consolidated financial statements included elsewhere in this prospectus. Our historical results are not necessarily indicative of the results that should be expected for any future period. You should read the following summary consolidated financial data together with the more detailed information contained in "Selected consolidated financial data," "Management's discussion and analysis of financial condition and results of operations" and our consolidated financial statements and the related notes included elsewhere in this prospectus.

	Years ended December 31,	
(in thousands, except share and per share data)	**2016**	**2017**
Consolidated Statements of Operations Data:		
Revenue	$ 7,015	$ 6,484
Operating expenses:		
Research and development	9,675	20,324
General and administrative	6,168	8,016
Impairment of intangible assets	—	118
Total operating expenses	15,843	28,458
Loss from operations	(8,828)	(21,974)
Other income:		
Interest income	570	872
Other income	2	—
Total other income	572	872
Loss before income tax expense	(8,256)	(21,102)
Income tax benefit	5	—
Net loss and net loss attributable to common stockholders—basic and diluted	$ (8,251)	$ (21,102)
Net loss per share attributable to common stockholders—basic and diluted	$ (0.24)	$ (0.62)
Weighted-average shares of common stock outstanding—basic and diluted(1)	34,825,334	33,956,010
Pro forma net loss per share attributable to common stockholders—basic and diluted (unaudited)(1)		
Pro forma weighted-average shares of common stock outstanding—basic and diluted (unaudited)(1)		

(1) See Note 10 to our audited consolidated financial statements included elsewhere in this prospectus for an explanation of the method used to calculate the historical and pro forma basic and diluted net loss per share of common stock and the weighted-average number of shares used in the computation of the per share amounts.

(in thousands)	As of December 31, 2017 Actual	Pro forma(1)	Pro forma as adjusted(2)
Consolidated Balance Sheet Data:			
Cash and cash equivalents	$ 62,802	$	$
Working capital(3)	55,129		
Total assets	72,682		
Total liabilities	99,051		
Accumulated deficit	(39,111)		
Stockholders' (deficit) equity	(26,369)		

(1) The pro forma consolidated balance sheet data gives effect to the automatic conversion of all outstanding shares of our convertible preferred stock into an aggregate of shares of common stock, which will occur upon the closing of this offering.

(2) Reflects the pro forma adjustments described in footnote (2) and the issuance and sale of shares of common stock in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

(3) We define working capital as current assets less current liabilities. See our consolidated financial statements included elsewhere in this prospectus for further details regarding our current assets and current liabilities.

Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted amount of each of cash and cash equivalents, working capital, total assets, and stockholders' (deficit) equity by $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions. Similarly, each increase (decrease) of 1.0 million shares in the number of shares offered by us at the assumed initial public offering price would increase (decrease) each of cash and cash equivalents, working capital, total assets, and stockholders' (deficit) equity by $ million, assuming the assumed initial public offering price per share remains the same and after deducting estimated underwriting discounts and commissions. The pro forma information discussed above is illustrative only and will be adjusted based on the actual initial public offering price and other terms of our initial public offering determined at pricing.

Risk factors

Investing in our common stock involves a high degree of risk. Before investing in our common stock, you should consider carefully the risks described below, together with the other information contained in this prospectus, including our consolidated financial statements and the related notes appearing herein. The occurrence of any of the following risks could materially adversely affect our business, financial condition, results of operations and prospects. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment.

Risks related to our financial condition, limited operating history and need for additional capital

We have incurred significant operating losses since our inception and expect to continue to incur losses for the foreseeable future. We have never been profitable, and may never achieve or maintain profitability.

We have never been profitable and do not expect to be profitable in the foreseeable future. Since inception, we have incurred significant operating losses. If our product candidates are not successfully developed and approved, we may never generate any revenue from product sales. Our net losses were $8.3 million and $21.1 million for the years ended December 31, 2016 and 2017, respectively. As of December 31, 2017, we had an accumulated deficit of $39.1 million. In addition, we have not commercialized any products and have never generated any revenue from product sales. Substantially all of our losses have resulted from expenses incurred in connection with our research and development activities, including our preclinical development activities, and from general and administrative costs associated with our operations. We have financed our operations primarily through private placements of our convertible preferred stock and our development and commercial license agreement dated February 24, 2016, as amended, with Les Laboratoires Servier, which we refer to as the Servier Agreement. The amount of our future net losses will depend, in part, on the amount and growth rate of our expenses and our ability to generate revenues.

All of our research and development activities in our cancer immunotherapy (allogeneic CAR T cells) and *in vivo* gene correction platforms are preclinical, and our food and agriculture platform is early stage. We have not yet received authorization from the U.S. Food and Drug Administration, or the FDA, to proceed with a clinical trial under an investigational new drug application, or IND, or advanced any potential therapeutic product candidates to human clinical trials. All of our current or future product candidates will require substantial additional development time and resources before we may realize revenue from product sales, if at all. We expect to continue to incur significant expenses and operating losses for the foreseeable future. We anticipate that our expenses will increase substantially if and as we:

- continue our current research and development programs, including conducting laboratory, preclinical and greenhouse studies for product candidates;
- initiate clinical or field trials for product candidates;
- seek to identify, assess, acquire or develop additional research programs or product candidates;
- maintain, expand and protect our intellectual property portfolio;
- seek marketing approvals for any product candidates that may successfully complete development;
- establish a sales, marketing and distribution infrastructure to commercialize any products that may obtain marketing approval;
- further develop and refine the manufacturing process for our product candidates;

- change or add additional manufacturers or suppliers of biological materials or product candidates;
- validate a commercial-scale manufacturing facility compliant with current Good Manufacturing Practices, or cGMP;
- further develop our genome editing technology;
- acquire or in-license other technologies;
- seek to attract and retain new and existing personnel;
- expand our facilities; and
- operate as a public company.

No clinical studies have begun on any of our therapeutic product candidates, and it will be several years, if ever, before we obtain regulatory approval for, and are ready for commercialization of, a therapeutic product candidate. Similarly, only one product candidate from our food and agriculture platform has advanced to field testing, and it will be several years, if ever, before we or our collaborators commercialize any such product candidate. Even if a product candidate receives regulatory approval, future revenues for such product candidate will depend upon many factors, such as, as applicable, the size of any markets in which such product candidate is approved for sale, the market share captured by such product candidate, including as a result of the market acceptance of such product candidate and the effectiveness of manufacturing, sales, marketing and distribution operations related to such product candidate, the terms of any collaboration or other strategic arrangement we may have with respect to such product candidate and levels of reimbursement from third-party payors. If we are unable to develop and commercialize one or more product candidates either alone or with collaborators, or if revenues from any product candidate that receives marketing approval or is commercialized are insufficient, we may not achieve profitability. Even if we do achieve profitability, we may not be able to sustain or increase profitability. If we are unable to achieve and maintain profitability, the value of our common stock will be materially adversely affected.

We will need substantial additional funding, and if we are unable to raise a sufficient amount of capital when needed on acceptable terms, or at all, we may be forced to delay, reduce or eliminate some or all of our research programs, product development activities and commercialization efforts.

The process of identifying product candidates and conducting preclinical or greenhouse studies and clinical or field trials is time consuming, expensive, uncertain and takes years to complete. We expect our expenses to increase in connection with our ongoing activities, particularly as we identify, continue the research and development of, initiate clinical or field trials of, and seek marketing approval for, product candidates. In addition, if any therapeutic product candidate that we develop alone or with collaborators obtains marketing approval, we may incur significant commercialization expenses related to product manufacturing, sales, marketing and distribution efforts. Furthermore, upon the closing of this offering, we expect to incur additional costs associated with operating as a public company. Accordingly, we will need to obtain substantial additional funding in connection with our continuing operations. If we are unable to raise sufficient capital when needed, we may be forced to delay, reduce or eliminate current or future research programs, product development activities and/or commercialization efforts.

We expect that our existing cash and cash equivalents, together with the net proceeds from this offering, will be sufficient to fund our expected operating expenses and capital expenditure requirements through . We have based this estimate on assumptions that may prove to be wrong, and we could use our capital resources sooner than we currently expect. Our operating plans and other demands on our cash resources may change as a result of many factors, including factors unknown to us, and we may need to seek additional funds sooner

than planned, through public or private equity or debt financings or other sources, such as strategic collaborations. We do not currently expect future grant revenues to be a material source of revenue. Attempting to secure additional financing may divert our management from our day-to-day activities, which may adversely affect our ability to develop product candidates. Our future capital requirements will depend on many factors, including:

- the timing, scope, progress, costs, results and analysis of results of research activities, preclinical or greenhouse studies and clinical or field trials for any of our product candidates;
- the costs of future activities, including product manufacturing, sales, marketing and distribution activities for any product candidates that receive regulatory approval;
- the success of our existing collaborative relationships;
- the extent to which we exercise any development or commercialization rights under collaborative relationships;
- our ability to establish and maintain additional collaborative relationships on favorable terms, or at all;
- the extent to which we expand our operations and the timing of such expansion, including with respect to facilities, employees and product development platforms;
- the costs of preparing, filing and prosecuting patent applications, maintaining and enforcing our intellectual property and proprietary rights and defending intellectual property-related claims;
- the extent to which we acquire or in-license other technologies or product candidates;
- the extent to which we acquire or invest in other businesses;
- the costs of operating as a public company; and
- the amount of revenues, if any, received from commercial sales of any products that we develop alone or with collaborators that receive regulatory approval.

Even if we believe we have sufficient funds for our current or future operating plans, we may seek additional capital if market conditions are favorable or in light of specific strategic considerations. Adequate additional financing may not be available to us on acceptable terms, or at all. If we are unable to obtain sufficient funding on a timely basis or on favorable terms, we may be required to significantly delay, reduce or eliminate one or more of our research or product development programs and/or commercialization efforts. We may also be unable to expand our operations or otherwise capitalize on business opportunities as desired. Any of these events could materially adversely affect our financial condition and business prospects.

Raising additional capital may cause dilution to our stockholders, including purchasers of common stock in this offering, restrict our operations or require us to relinquish rights to our technologies or product candidates.

Until such time, if ever, as we can generate substantial product revenues, we expect to finance our cash needs through a combination of equity and/or debt financings and collaborations, licensing agreements or other strategic arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of such securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. To the extent that we raise additional capital through debt financing, it would result in increased fixed payment obligations and a portion of our operating cash flows, if any, being dedicated to the payment of principal and interest on such indebtedness. In addition, debt financing may involve agreements that include restrictive covenants that impose operating restrictions, such as restrictions on the incurrence of additional debt, the making of certain

capital expenditures or the declaration of dividends. To the extent we raise additional capital through arrangements with collaborators or otherwise, we may be required to relinquish some of our technologies, research programs, product development activities, product candidates and/or future revenue streams, license our technologies and/or product candidates on unfavorable terms or otherwise agree to terms unfavorable to us. Furthermore, any capital raising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to advance research programs, product development activities or product candidates.

We have a limited operating history, which makes it difficult to evaluate our current business and future prospects and may increase the risk of your investment.

We are a preclinical-stage genome editing company with a limited operating history. We formed our company in 2006 and spent the first nine years of our company's history developing and refining our core technology, and only during the past several years have we focused our efforts on advancing the development of product candidates. Investment in biopharmaceutical and agricultural biotechnology product development is a highly speculative endeavor. It entails substantial upfront capital expenditures, and there is significant risk that any product candidate will fail to demonstrate adequate efficacy or an acceptable safety profile, obtain any required regulatory approvals or become commercially viable. Our genome editing platform and the technologies we are using are new and unproven. All of our therapeutic product candidates are in preclinical stages. We have not yet advanced any product candidates to human clinical trials, and only one of the product candidates from our food and agriculture platform has progressed to field trials. We have not yet demonstrated an ability to initiate or successfully complete any clinical or field trials, obtain any required marketing approvals, manufacture products, conduct sales, marketing and distribution activities, or arrange for a third party to do any of the foregoing on our behalf. Consequently, any predictions made about our future success or viability may not be as accurate as they could be if we had a history of successfully developing and commercializing products.

Additionally, we encounter risks and difficulties frequently experienced by new and growing companies in rapidly developing and changing industries, including challenges in forecasting accuracy, determining appropriate investments of our limited resources, gaining market acceptance of our technology, managing a complex regulatory landscape and developing new product candidates, which may make it more difficult to evaluate our likelihood of success. Our current operating model may require changes in order for us to adjust to these challenges or scale our operations efficiently. Our limited operating history, particularly in light of the rapidly evolving nature of the biopharmaceutical and agricultural biotechnology industries and the genome editing field, may make it difficult to evaluate our technology and business prospects or to predict our future performance. Additionally, due to the stage of our operations, we expect that our financial condition and operating results may fluctuate significantly from quarter to quarter as a result of many factors as we build our business, and you should not rely upon the results of any particular quarterly or annual period as indications of future operating performance.

We may expend our limited resources pursuing particular research programs or product candidates that may be less successful or profitable than other programs or product candidates.

Research programs to identify new product candidates and product development platforms require substantial technical, financial and human resources. We may focus our efforts and resources on potential programs, product candidates or product development platforms that ultimately prove to be unsuccessful. Any time, effort and financial resources we expend on identifying and researching new product candidates and product development platforms may divert our attention from, and adversely affect our ability to continue, development and commercialization of existing research programs, product candidates and product development platforms. Clinical trials or field trials, as applicable, of any of our product candidates may never

commence despite the expenditure of significant resources in pursuit of their development, and our spending on current and future research and development programs, product candidates and product development platforms may not yield any commercially viable products. As a result of having limited financial and managerial resources, we may forego or delay pursuit of opportunities that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to timely capitalize on viable commercial products or profitable market opportunities. Additionally, if we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing or other strategic arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate.

We expect to take advantage of a Research and Development Tax Incentive program in Australia, which could be amended or changed.

We may be eligible to receive a financial incentive from the Australian government as part of its Research and Development Tax Incentive program, or R&D Tax Incentive program. The R&D Tax Incentive program is one of the key elements of the Australian government's support for Australia's innovation system and, if eligible, provides the recipient with a 43.5% refundable tax offset for research and development activities in Australia. There have been recent proposals to change the structure of the innovation and research and development funding landscape in Australia, which may impact the research and development tax incentive receivable for the 2018 financial year and beyond. There can be no assurance that we will qualify and be eligible for such incentives or that the Australian government will continue to provide incentives, offset, grants and rebates on similar terms or at all.

Risks related to the identification, development and commercialization of our product candidates

ARCUS is a novel technology, making it difficult to predict the time, cost and potential success of product candidate development.

Our success depends on our ability to develop and commercialize product candidates using our novel genome editing technology. The novel nature of our technology makes it difficult to accurately predict the developmental challenges we may face for product candidates as they proceed through research, preclinical or greenhouse studies and clinical or field trials. There have been a limited number of clinical trials of products created with genome editing technologies, none of which has utilized our technology, and no therapeutic product candidates created with other genome editing technologies have received marketing approval in the United States or Europe. Because our therapeutic research programs are all in research or preclinical stages, we have not yet been able to assess the safety or efficacy of any product candidates in humans. Current or future product candidates may not meet safety and efficacy requirements for continued development or ultimate approval in humans and may cause significant adverse events or toxicities. All of our product candidates are designed to act at the level of DNA, and because animal DNA differs from human DNA, it will be difficult for us to test our therapeutic product candidates in animal models for either safety or efficacy, and any testing that we conduct may not translate to their effects in humans. Moreover, animal models may not exist for some of the targets, diseases or indications that we intend to pursue. Similarly, we and our collaborators have not yet completed field trials for any agricultural product candidates created with our technology. Our product candidates may not be able to properly implement desired genetic edits with sufficient accuracy to be viable therapeutic or agricultural products, and there may be long-term effects associated with them that we cannot predict at this time. Any problems we experience related to the development of our genome editing technology or any of our or our collaborators' research programs or product candidates may cause significant delays or unanticipated costs, and we may not be able to satisfactorily solve such problems. These factors may prevent us

or our collaborators from completing our preclinical or greenhouse studies or any clinical or field trials that we or our collaborators may initiate, or profitably commercializing any product candidates on a timely basis, or at all. We may also experience delays in developing a sustainable, reproducible and scalable manufacturing process as we develop and prepare to commercialize product candidates. These factors make it more difficult for us to predict the time, cost and potential success of product candidate development. If our product development activities take longer or cost more than anticipated, or if they ultimately are not successful, it would materially adversely affect our business and results of operations.

The genome editing field is relatively new and evolving rapidly, and other existing or future technologies may provide significant advantages over our ARCUS platform, which could materially harm our business.

To date, we have focused our efforts on optimizing our proprietary genome editing technology and exploring its potential applications. ARCUS is a novel genome editing technology using sequence-specific DNA-cutting enzymes, or nucleases, to perform modifications in the DNA of living cells and organisms. Other companies have previously undertaken research and development of genome editing technologies using zinc finger nucleases, transcription activator-like effector nucleases, or TALENs, and clustered regularly interspaced short palindromic repeats associated protein-9 nuclease, or CRISPR/Cas9, although none has obtained marketing approval for a product candidate developed using such technologies. Other genome editing technologies, or other existing or future technologies, may lead to the development of treatments or products that may be considered better suited for use in human therapeutics or agriculture, which could reduce or eliminate our commercial opportunity.

We are heavily dependent on the successful development and translation of ARCUS, and due to the early stages of our product development operations, we cannot give any assurance that any product candidates will be successfully developed and commercialized.

We are at an early stage of development of the product candidates currently in our programs and are continuing to develop our ARCUS technology. To date, we have invested substantially all of our efforts and financial resources to develop ARCUS and advance our current product development programs, including conducting preclinical studies and other early research and development activities, and providing general and administrative support for these operations. Our future success is dependent on our ability to successfully develop and, where applicable, obtain regulatory approval for, including marketing approval for, and then successfully commercialize, product candidates, either alone or with collaborators. We have not yet developed and commercialized any product candidates, and we may not be able to do so, alone or with collaborators.

Our research and development programs may not lead to the successful identification, development or commercialization of any products.

The success of our business depends primarily upon our ability to identify, develop and commercialize products using our genome editing technology. With the exception of one product candidate for food and agriculture that is in field trials, all current product candidates and product development programs are still in the discovery, preclinical or greenhouse stages. We may be unsuccessful in advancing those product candidates into clinical development or field trials or in identifying any developing additional product candidates. Our ability to identify and develop product candidates is subject to the numerous risks associated with preclinical and early stage biotechnology development activities, including that:

- the use of ARCUS may be ineffective in identifying additional product candidates;
- we may not be able to assemble sufficient resources to acquire or discover additional product candidates;
- we may not be able to enter into collaborative arrangements to facilitate development of product candidates;

- competitors may develop alternatives that render our product candidates obsolete or less attractive;
- our product candidates may be covered by third parties' patents or other exclusive rights;
- the regulatory pathway for a product candidate may be too complex, expensive or otherwise difficult to navigate successfully; or
- our product candidates may be shown to not be effective, have harmful side effects or otherwise pose risks not outweighed by such product candidate's benefits or have other characteristics that may make the products impractical to manufacture, unlikely to receive any required marketing approval, unlikely to generate sufficient market demand or otherwise not achieve profitable commercialization.

Even if we do commence clinical trials of product candidates and continue to identify new product candidates, such product candidates may never be approved. Failure to successfully identify and develop new product candidates and obtain regulatory approvals for our products would have a material adverse effect on our business and financial condition and could cause us to cease operations.

If our product candidates do not achieve projected development milestones or commercialization in the announced or expected timeframes, the further development or commercialization of such product candidates may be delayed, and our business will be harmed.

We sometimes estimate, or may in the future estimate, the timing of the accomplishment of various scientific, clinical, manufacturing, regulatory and other product development objectives. These milestones may include our expectations regarding the commencement or completion of scientific studies or clinical or field trials, the submission of regulatory filings, the receipt of marketing approval or the realization of other commercialization objectives. The achievement of many of these milestones may be outside of our control. All of these milestones are based on a variety of assumptions, including assumptions regarding capital resources, constraints and priorities, progress of and results from development activities and the receipt of key regulatory approvals or actions, any of which may cause the timing of achievement of the milestones to vary considerably from our estimates. If we or our collaborators fail to achieve announced milestones in the expected timeframes, the commercialization of the product candidates may be delayed, our credibility may be undermined, our business and results of operations may be harmed, and the trading price of our common stock may decline.

Adverse public perception of genome editing may negatively impact the developmental progress or commercial success of products that we develop alone or with collaborators.

The developmental and commercial success of our current product candidates, or any that we develop alone or with collaborators in the future, will depend in part on public acceptance of the use of genome editing technology for the prevention or treatment of human diseases or for application in food or agricultural products. Adverse public perception of applying genome editing technology for these purposes may negatively impact our ability to raise capital or enter into strategic agreements for the development of product candidates.

The commercial success of any food or agricultural products that we develop alone or with collaborators may be adversely affected by claims that biotechnology plant products are unsafe for consumption or use, pose risks of damage to the environment or create legal, social or ethical dilemmas. Additionally, the public may perceive any potential food or agricultural products created with ARCUS to constitute genetically modified organisms, or GMO, even if they do not constitute genetically modified organisms under relevant regulatory requirements, and may be unwilling to consume them because of negative opinions regarding consumption of genetically modified organisms. This may result in expenses, delays or other impediments to development programs in our food and agriculture platform or the market acceptance and commercialization of any potential food or agricultural products.

Any therapeutic product candidates may involve editing the human genome. The commercial success of any such potential therapeutic products, if successfully developed and approved, may be adversely affected by claims that genome editing is unsafe, unethical or immoral. This may lead to unfavorable public perception and the inability of any therapeutic product candidates to gain the acceptance of the public or the medical community. Unfavorable public perceptions may also adversely impact our or our collaborators' ability to enroll clinical trials for therapeutic product candidates. Moreover, success in commercializing any therapeutic product candidates that receive regulatory approval will depend upon physicians prescribing, and their patients being willing to receive, treatments that involve the use of such product candidates in lieu of, or in addition to, existing treatments with which they are already familiar and for which greater clinical data may be available. Publicity of any adverse events in, or unfavorable results of, preclinical studies or clinical trials for any current or future product candidates, or with respect to the studies or trials of our competitors or of academic researchers utilizing genome editing technologies, even if not ultimately attributable to our technology or product candidates, could negatively influence public opinion. Negative public perception about the use of genome editing technology in human therapeutics and food or agricultural products, whether related to our technology or a competitor's technology, could result in increased governmental regulation, delays in the development and commercialization of product candidates or decreased demand for the resulting products, any of which may have a negative impact on our business and financial condition.

Interim "top-line" and preliminary data from studies or trials that we announce or publish from time to time may change as more data become available and are subject to audit and verification procedures that could result in material changes in the final data.

From time to time, we may publish interim "top-line" or preliminary data from preclinical or greenhouse studies or clinical or field trials. Interim data are subject to the risk that one or more of the outcomes may materially change as more data become available. We also make assumptions, estimations, calculations and conclusions as part of our analyses of data, and we may not have received or had the opportunity to fully and carefully evaluate all data. As a result, the topline results that we report may differ from future results of the same studies, or different conclusions or considerations may qualify such results, once additional data have been received and fully evaluated. Preliminary or "top-line" data also remain subject to audit and verification procedures that may result in the final data being materially different from the preliminary data we previously published. As a result, interim and preliminary data should be viewed with caution until the final data are available. Additionally, interim data from clinical trials that we may complete are subject to the risk that one or more of the clinical outcomes may materially change as patient enrollment continues and more patient data become available. Adverse differences between preliminary or interim data and final data could significantly harm our business prospects.

Further, others, including regulatory agencies, may not accept or agree with our assumptions, estimates, calculations, conclusions or analyses or may interpret or weigh the importance of data differently, which could impact the value of the particular program, the approvability or commercialization of the particular product candidate or product and our company in general. In addition, the information we choose to publicly disclose regarding a particular study or clinical trial is based on what is typically extensive information, and you or others may not agree with what we determine is the material or otherwise appropriate information to include in our disclosure. Any information we determine not to disclose may ultimately be deemed significant by you or others with respect to future decisions, conclusions, views, activities or otherwise regarding a particular product candidate or our business. If the topline data that we report differ from actual results, or if others, including regulatory authorities, disagree with the conclusions reached, our ability to obtain approval for, and commercialize, product candidates may be harmed, which could significantly harm our business prospects.

We face significant competition in industries experiencing rapid technological change, and there is a possibility that our competitors may achieve regulatory approval before us or develop product candidates or treatments that are safer or more effective than ours, which may harm our financial condition and our ability to successfully market or commercialize any of our product candidates.

The development and commercialization of new drug products is highly competitive, and the genome editing field is characterized by rapidly changing technologies, significant competition and a strong emphasis on intellectual property. We will face competition with respect to our current and future therapeutic product candidates from major pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies worldwide. Potential competitors also include academic institutions, government agencies and other public and private research organizations that conduct research, seek patent protection and establish collaborative arrangements for research, development, manufacturing and commercialization of products. Competition for improving plant genetics comes from conventional and advanced plant breeding techniques, as well as from the development of advanced biotechnology traits. Other potentially competitive sources of improvement in crop yields include improvements in crop protection chemicals, fertilizer formulations, farm mechanization, other biotechnology and information management. Programs to improve genetics and crop protection chemicals are generally concentrated within a relatively small number of large companies, while non-genetic approaches are underway with a broader set of companies.

There are a number of large pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of products for the treatment of the disease indications for which we have research programs. Some of these competitive products and therapies are based on scientific approaches that are similar to our approach, and others are based on entirely different approaches. We principally compete with others developing and utilizing genome editing technology in the human health and plant sciences sectors, including companies such as Cellectis S.A., CRISPR Therapeutics, AG, Editas Medicine, Inc., Intellia Therapeutics, Inc. and Sangamo Therapeutics, Inc. Several companies, including Novartis Pharmaceuticals Corp. and Gilead Sciences, Inc., or Gilead, have obtained FDA approval for autologous immunotherapies, and a number of companies, including Cellectis S.A., Celgene Corp., Allogene Therapeutics and CRISPR Therapeutics AG, are pursuing allogeneic immunotherapies. We expect that our operations focused on developing products for *in vivo* gene correction will face substantial competition from others focusing on gene therapy treatments, especially those that may focus on conditions that our product candidates target. Moreover, any human therapeutics products that we develop alone or with collaborators will compete with existing standards of care for the diseases and conditions that our product candidates target and other types of treatments, such as small molecule, antibody or protein therapies. Our competitors in the agricultural biotechnology space include Pairwise Plants, LLC, Caribou Biosciences, Inc., Corteva Agriscience, Tropic Biosciences UK LTD, Calyxt, Inc. and Cibus.

Many of our current or potential competitors, either alone or with their collaborators, have significantly greater financial resources and expertise in research and development, manufacturing, preclinical or greenhouse testing, conducting clinical or field trials, obtaining regulatory approvals and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical, biotechnology and agricultural biotechnology industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than any products we develop alone or with collaborators or that would render

any such products obsolete or non-competitive. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we or our collaborators may obtain approval for any that we develop, which could result in our competitors establishing a strong market position before we are able to enter the market. Additionally, technologies developed by our competitors may render our product candidates uneconomical or obsolete, and we or our collaborators may not be successful in marketing any product candidates we may develop against competitors. The availability of our competitors' products could limit the demand, and the price we are able to charge, for any products that we develop alone or with collaborators.

Our future profitability, if any, depends in part on our and our collaborators' ability to penetrate global markets, where we would be subject to additional regulatory burdens and other risks and uncertainties associated with international operations that could materially adversely affect our business.

Our future profitability, if any, will depend in part on our ability and the ability of our collaborators to commercialize any products that we or our collaborators may develop in markets throughout the world. Commercialization of products in various markets could subject us to risks and uncertainties, including:

- obtaining, on a country-by-country basis, the applicable marketing authorization from the competent regulatory authority;
- the burden of complying with complex and changing regulatory, tax, accounting, labor and other legal requirements in each jurisdiction that we or our collaborators pursue;
- reduced protection for intellectual property rights;
- differing medical and agricultural practices and customs affecting acceptance in the marketplace;
- import or export licensing requirements;
- governmental controls, trade restrictions or changes in tariffs;
- economic weakness, including inflation, or political instability in particular non-U.S. economies and markets;
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad;
- longer accounts receivable collection times;
- longer lead times for shipping;
- language barriers;
- foreign currency exchange rate fluctuations;
- foreign reimbursement, pricing and insurance regimes; and
- the interpretation of contractual provisions governed by foreign laws in the event of a contract dispute.

We have no prior experience in these areas, and our collaborators may have limited experience in these areas. Failure to successfully navigate these risks and uncertainties may limit or prevent market penetration for any products that we or our collaborators may develop, which would limit their commercial potential and our revenues.

Product liability lawsuits against us could cause us to incur substantial liabilities and could limit commercialization of any products that we develop alone or with collaborators.

We face an inherent risk of product liability and professional indemnity exposure related to the testing in clinical or field trials of our product candidates. We will face an even greater liability risk if we commercially sell any products that we or our collaborators may develop for human use or consumption. Manufacturing defects, errors in product distribution or storage processes, improper administration or application and known or unknown side effects of product usage may result in liability claims against us or third parties with which we have relationships. These actions could include claims resulting from acts by our collaborators, licensees and subcontractors over which we have little or no control.

For example, our liability could be sought by patients participating in clinical trials for potential therapeutic product candidates as a result of unexpected side effects, improper product administration or the deterioration of a patient's condition, patient injury or even death. Criminal or civil proceedings might be filed against us by patients, regulatory authorities, biopharmaceutical companies and any other third party using or marketing any product candidates or products that we develop alone or with collaborators. On occasion, large judgments have been awarded in class action lawsuits based on products that had unanticipated adverse effects. If we cannot successfully defend ourselves against claims that product candidates or products we develop alone or with collaborators caused harm, we could incur substantial liabilities.

Regardless of merit or eventual outcome, liability claims may result in:

- significant time and costs to defend the related litigation;
- injury to our reputation and significant negative media attention;
- diversion of management's attention from pursuing our strategy;
- withdrawal of clinical trial participants;
- delay or termination of clinical trials;
- decreased demand for any products that we develop alone or with collaborators;
- substantial monetary awards to trial participants or patients;
- product recalls, withdrawals or labeling, marketing or promotional restrictions;
- loss of revenue; and
- the inability to further develop or commercialize any products.

Although the clinical trial process is designed to identify and assess potential side effects, clinical development does not always fully characterize the safety and efficacy profile of a new medicine, and it is always possible that a drug or biologic, even after regulatory approval, may exhibit unforeseen side effects. If our product candidates were to cause adverse side effects during clinical trials or after approval, we may be exposed to substantial liabilities. Physicians and patients may not comply with any warnings that identify known potential adverse effects and patients who should not use our product candidates. If any of our product candidates are approved for commercial sale, we will be highly dependent upon consumer perceptions of us and the safety and quality of such products. We could be adversely affected if we are subject to negative publicity associated with illness or other adverse effects resulting from patients' use or misuse of such products or any similar products distributed by other companies.

Although we maintain product liability insurance coverage, it may not be adequate to cover all liabilities that we may incur. We anticipate that we will need to increase our insurance coverage when we begin clinical trials

and if we or our collaborators successfully commercialize any products. Insurance coverage is increasingly expensive. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liabilities to which we may become subject.

Additional risks related to the identification, development and commercialization of our therapeutic product candidates

The regulatory landscape that will apply to development of therapeutic product candidates by us or our collaborators is rigorous, complex, uncertain and subject to change, which could result in delays or termination of development of such product candidates or unexpected costs in obtaining regulatory approvals.

Regulatory requirements governing products created with genome editing technology or involving gene therapy treatment have changed frequently and will likely continue to change in the future. Approvals by one regulatory agency may not be indicative of what any other regulatory agency may require for approval, and there is substantial, and sometimes uncoordinated, overlap in those responsible for regulation of gene therapy products, cell therapy products and other products created with genome editing technology. For example, in addition to the submission of an investigational new drug application, or IND, to the FDA, before initiation of a clinical trial in the United States, certain human clinical trials for cell therapy products and gene therapy had historically been subject to review by the Recombinant DNA Advisory Committee, or the RAC, of the National Institutes of Health, or NIH, Office of Biotechnology Activities, or OBA, pursuant to the NIH Guidelines for Research Involving Recombinant DNA Molecules, or NIH Guidelines. Following an initial review, RAC members would make a recommendation as to whether the protocol raises important scientific, safety, medical, ethical or social issues that warrant in-depth discussion at the RAC's quarterly meetings. Even though the FDA decides whether individual cell therapy or gene therapy protocols may proceed under an IND, the RAC's recommendations were shared with the FDA and the RAC public review process, if undertaken, could delay the initiation of a clinical trial, even if the FDA had reviewed the trial design and details and has not objected to its initiation or has notified the sponsor that the study may begin. Conversely, the FDA can put an IND on clinical hold even if the RAC provided a favorable review or has recommended against an in-depth, public review.

On August 17, 2018, the NIH issued a notice in the Federal Register and issued a public statement proposing changes to the oversight framework for gene therapy trials, including changes to the applicable NIH Guidelines to modify the roles and responsibilities of the RAC with respect to human clinical trials of gene therapy products, and requesting public comment on its proposed modifications. During the public comment period, which closed October 16, 2018, the NIH has announced that it will no longer accept new human gene transfer protocols for review as part of the protocol registration process under the existing NIH Guidelines or convene the RAC to review individual clinical protocols. These trials will remain subject to the FDA's oversight and other clinical trial regulations, and oversight at the local level will continue as otherwise set forth in the NIH Guidelines. Specifically, under the NIH Guidelines, supervision of human gene transfer trials includes evaluation and assessment by an institutional biosafety committee, or IBC, a local institutional committee that reviews and oversees research utilizing recombinant or synthetic nucleic acid molecules at that institution. The IBC assesses the safety of the research and identifies any potential risk to public health or the environment, and such review may result in some delay before initiation of a clinical trial. While the NIH Guidelines are not mandatory unless the research in question is being conducted at or sponsored by institutions receiving NIH funding of recombinant or synthetic nucleic acid molecule research, many companies and other institutions not otherwise subject to the NIH Guidelines voluntarily follow them. Even though we may not be required to submit a protocol for our gene therapy product candidates through the NIH for RAC review, we will still be subject to significant regulatory oversight by the FDA, and in addition to the government regulators, the applicable IBC and institutional review board, or IRB, of each institution at which we or our collaborators conduct clinical trials of our product candidates, or a central IRB if appropriate, would need to review and approve the proposed clinical trial.

The same applies in the European Union, or the EU. The European Medicines Agency, or the EMA, has a Committee for Advanced Therapies, or CAT, that is responsible for assessing the quality, safety and efficacy of advanced-therapy medicinal products. Advanced-therapy medical products include gene therapy medicine, somatic-cell therapy medicines and tissue-engineered medicines. The role of the CAT is to prepare a draft opinion on an application for marketing authorization for a gene therapy medicinal candidate that is submitted to the EMA. In the EU, the development and evaluation of a gene therapy medicinal product must be considered in the context of the relevant EU guidelines. The EMA may issue new guidelines concerning the development and marketing authorization for gene therapy medicinal products and require that we comply with these new guidelines. Similarly complex regulatory environments exist in other jurisdictions in which we might consider seeking regulatory approvals for our product candidates, further complicating the regulatory landscape. As a result, the procedures and standards applied to gene therapy products and cell therapy products may be applied to any of our gene therapy or genome editing product candidates, but that remains uncertain at this point.

The clinical trial requirements of the FDA, the EMA and other regulatory authorities and the criteria these regulators use to evaluate the safety and efficacy of a product candidate vary substantially according to the type, complexity, novelty and intended use and market of the potential products. The regulatory approval process for product candidates created with novel genome editing technology such as ours can be more lengthy, rigorous and expensive than the process for other better known or more extensively studied product candidates and technologies. Since we are developing novel treatments for diseases in which there is little clinical experience with new endpoints and methodologies, there is heightened risk that the FDA, the EMA or comparable regulatory bodies may not consider the clinical trial endpoints to provide clinically meaningful results, and the resulting clinical data and results may be more difficult to analyze. This may be a particularly significant risk for many of the genetically defined diseases for which we may develop product candidates alone or with collaborators due to small patient populations for those diseases, and designing and executing a rigorous clinical trial with appropriate statistical power is more difficult than with diseases that have larger patient populations. Regulatory agencies administering existing or future regulations or legislation may not allow production and marketing of products utilizing genome editing technology in a timely manner or under technically or commercially feasible conditions. Even if our product candidates obtain required regulatory approvals, such approvals may later be withdrawn as a result of changes in regulations or the interpretation of regulations by applicable regulatory agencies.

Changes in applicable regulatory guidelines may lengthen the regulatory review process for our product candidates, require additional studies or trials, increase development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of such product candidates, or lead to significant post-approval limitations or restrictions. Additionally, adverse developments in clinical trials conducted by others of gene therapy products or products created using genome editing technology, such as products developed through the application of a CRISPR/Cas9 technology, or adverse public perception of the field of genome editing, may cause the FDA, the EMA and other regulatory bodies to revise the requirements for approval of any product candidates we may develop or limit the use of products utilizing genome editing technologies, either of which could materially harm our business. Furthermore, regulatory action or private litigation could result in expenses, delays or other impediments to our research programs or the development or commercialization of current or future product candidates.

As we advance product candidates alone or with collaborators, we will be required to consult with these regulatory and advisory groups and comply with all applicable guidelines, rules and regulations. If we fail to do so, we or our collaborators may be required to delay or terminate development of such product candidates. Delay or failure to obtain, or unexpected costs in obtaining, the regulatory approval necessary to bring a product candidate to market could decrease our ability to generate sufficient product revenue to maintain our business.

The regulatory approval processes of the FDA and comparable foreign authorities are lengthy, time consuming and inherently unpredictable, and if we are ultimately unable to obtain regulatory approval for our product candidates, our business will be substantially harmed.

We and any collaborators are not permitted to commercialize, market, promote or sell any product candidate in the United States without obtaining marketing approval from the FDA. Foreign regulatory authorities, such as the EMA, impose similar requirements. The time required to obtain approval by the FDA, the EMA and comparable foreign authorities is unpredictable, but typically takes many years following the commencement of clinical trials and depends upon numerous factors, including substantial discretion of the regulatory authorities. In addition, approval policies, regulations or the type and amount of clinical data necessary to gain approval may change during the course of a product candidate's clinical development and may vary among jurisdictions. To date, we have not submitted a biologics license application, or BLA, or other marketing authorization application to the FDA or similar drug approval submissions to comparable foreign regulatory authorities for any product candidate. We and any collaborators must complete additional preclinical or nonclinical studies and clinical trials to demonstrate the safety and efficacy of our product candidates in humans to the satisfaction of the regulatory authorities before we will be able to obtain these approvals.

Our product candidates could fail to receive regulatory approval for many reasons, including the following:

- the FDA or comparable foreign regulatory authorities may disagree with the design or implementation of our or our collaborators' clinical trials;
- we or our collaborators may be unable to demonstrate to the satisfaction of the FDA or comparable foreign regulatory authorities that a product candidate is safe and effective for its proposed indication;
- the results of clinical trials may not meet the level of statistical significance required by the FDA or comparable foreign regulatory authorities for approval;
- we or our collaborators may be unable to demonstrate that a product candidate's clinical and other benefits outweigh its safety risks;
- the FDA or comparable foreign regulatory authorities may disagree with our or our collaborators' interpretation of data from preclinical studies or clinical trials;
- the data collected from clinical trials of product candidates may not be sufficient to support the submission of a BLA or other submission or to obtain regulatory approval in the United States or elsewhere;
- the FDA or comparable foreign regulatory authorities may fail to approve the manufacturing processes or facilities of third-party manufacturers with which we or our collaborators contract for clinical and commercial supplies;
- the FDA or comparable foreign regulatory authorities may fail to approve the companion diagnostics we contemplate developing with collaborators; and
- the approval policies or regulations of the FDA or comparable foreign regulatory authorities may significantly change in a manner rendering our or our collaborators' clinical data insufficient for approval.

This lengthy approval process as well as the unpredictability of future clinical trial results may result in our failing to obtain regulatory approval to market our product candidates, which would significantly harm our business, results of operations and prospects.

In addition, even if we were to obtain approval, regulatory authorities may approve any of our product candidates for fewer or more limited indications than we request, may impose significant limitations in the

form of narrow indications, warnings, or a Risk Evaluation and Mitigation Strategy, or REMS. Regulatory authorities may not approve the price we or our collaborators intend to charge for products we may develop, may grant approval contingent on the performance of costly post-marketing clinical trials, or may approve a product candidate with a label that does not include the labeling claims necessary or desirable for the successful commercialization of that product candidate. Any of the foregoing scenarios could materially harm the commercial prospects for our product candidates.

Clinical trials are difficult to design and implement, expensive, time-consuming and involve an uncertain outcome, and the inability to successfully and timely conduct clinical trials and obtain regulatory approval for our product candidates would substantially harm our business.

Clinical testing is expensive and usually takes many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process, and product candidates in later stages of clinical trials may fail to show the desired safety and efficacy traits despite having progressed through preclinical studies and initial clinical trials. To date, neither we nor our collaborators have initiated any clinical trials for any product candidates. We do not know whether planned clinical trials will begin on time, need to be redesigned, recruit and enroll patients on time or be completed on schedule, or at all. Clinical trials can be delayed, suspended or terminated for a variety of reasons, including in connection with:

- the inability to generate sufficient preclinical, toxicology or other *in vivo* or *in vitro* data to support the initiation of clinical trials;
- applicable regulatory authorities disagreeing as to the design or implementation of the clinical trials;
- obtaining regulatory authorization to commence a trial;
- reaching an agreement on acceptable terms with prospective contract research organizations, or CROs, and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- obtaining IRB approval at each site;
- developing and validating the companion diagnostic to be used in a clinical trial, if applicable;
- insufficient or inadequate supply or quality of product candidates or other materials necessary for use in clinical trials, or delays in sufficiently developing, characterizing or controlling a manufacturing process suitable for clinical trials;
- recruiting and retaining enough suitable patients to participate in a trial;
- having enough patients complete a trial or return for post-treatment follow-up;
- adding a sufficient number of clinical trial sites;
- inspections of clinical trial sites or operations by applicable regulatory authorities, or the imposition of a clinical hold;
- clinical sites deviating from trial protocol or dropping out of a trial;
- the inability to demonstrate the efficacy and benefits of a product candidate;
- discovering that product candidates have unforeseen safety issues, undesirable side effects or other unexpected characteristics;
- addressing patient safety concerns that arise during the course of a trial;

- receiving untimely or unfavorable feedback from applicable regulatory authorities regarding the trial or requests from regulatory authorities to modify the design of a trial;
- non-compliance with applicable regulatory requirements by us or third parties or changes in such regulations or administrative actions;
- suspensions or terminations by IRBs of the institutions at which such trials are being conducted, by the Data Safety Monitoring Board, or DSMB, for such trial or by the FDA or other regulatory authorities due to a number of factors, including those described above;
- third parties being unable or unwilling to satisfy their contractual obligations to us; or
- changes in our financial priorities, greater than anticipated costs of completing a trial or our inability to continue funding the trial.

Many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates. Additionally, we or our collaborators may experience unforeseen events during or resulting from clinical trials that could delay or prevent receipt of marketing approval for or commercialization of product candidates. For example, clinical trials of product candidates may produce negative, inconsistent or inconclusive results, and we may decide, or regulators may require us, to conduct additional clinical trials or abandon development programs. Regulators may also revise the requirements for approving the product candidates, or such requirements may not be as we anticipate. If we or our collaborators are required to conduct additional clinical trials or other testing of product candidates beyond those that we or our collaborators currently contemplate, if we or our collaborators are unable to successfully complete clinical trials or other testing of such product candidates, if the results of these trials or tests are not positive or are only modestly positive or if there are safety concerns, we may:

- incur unplanned costs;
- be delayed in obtaining or fail to obtain marketing approval for product candidates;
- obtain marketing approval in some countries and not in others;
- obtain marketing approval for indications or patient populations that are not as broad as intended or desired;
- obtain marketing approval with labeling that includes significant use or distribution restrictions or safety warnings, including boxed warnings;
- be subject to additional post-marketing testing requirements;
- be subject to changes in the way the product is administered;
- have regulatory authorities withdraw or suspend their approval of the product or impose restrictions on its distribution;
- be sued; or
- experience damage to our reputation.

If we or our collaborators experience delays in the commencement or completion of our clinical trials, or if we or our collaborators terminate a clinical trial prior to completion, we may experience increased costs, have difficulty raising capital and/or be required to slow down the development and approval process timelines. Furthermore, the product candidates that are the subject of such trials may never receive regulatory approval, and their commercial prospects and our ability to generate product revenues from them could be impaired or not realized at all.

Any product candidates that we or our collaborators may develop will be novel and may be complex and difficult to manufacture, and if we experience manufacturing problems, it could result in delays in development and commercialization of such product candidates or otherwise harm our business.

Our product candidates involve or will involve novel genome editing technology and will require processing steps that are more complex than those required for most small molecule drugs, resulting in a relatively higher manufacturing cost. Moreover, unlike small molecules, the physical and chemical properties of biologics generally cannot be fully characterized. As a result, assays of the finished product may not be sufficient to ensure that such product will perform in the intended manner. Although we intend to employ multiple steps to control the manufacturing process, we may experience manufacturing issues with any of our product candidates that could cause production interruptions, including contamination, equipment or reagent failure, improper installation or operation of equipment, facility contamination, raw material shortages or contamination, natural disasters, disruption in utility services, human error, disruptions in the operations of our suppliers, inconsistency in cell growth and variability in product characteristics. We may encounter problems achieving adequate quantities and quality of clinical-grade materials that meet FDA, EMA or other comparable applicable standards or specifications with consistent and acceptable production yields and costs. Even minor deviations from normal manufacturing processes could result in reduced production yields, product defects and other supply disruptions. If microbial, viral or other contaminations are discovered in our product candidates or in the manufacturing facilities in which such product candidates are made, such manufacturing facilities may need to be closed for an extended period of time to investigate and remedy the contamination. Our manufacturing process for any allogeneic CAR T cell product candidate that we develop alone or with collaborators will be susceptible to product loss or failure due to logistical issues associated with the collection of white blood cells, or starting material, from healthy third-party donors, shipping such material to the manufacturing site, ensuring standardized production batch-to-batch in the context of mass production, freezing the manufactured product, shipping the final product globally and infusing patients with such product. Problems with the manufacturing process, even minor deviations from the normal process, could result in product defects or manufacturing failures that result in lot failures, product recalls, product liability claims or insufficient inventory.

As product candidates are developed through preclinical to late-stage clinical trials towards approval and commercialization, we expect that various aspects of the development program, such as manufacturing methods, may be altered along the way in an effort to help optimize processes and results. Such changes carry the risk that they will not achieve the intended objectives, and any of these changes could cause our product candidates to perform differently and affect the results of future clinical trials or our reliance on results of trials that have previously been conducted using the product candidate in its previous form. If the manufacturing process is changed during the course of product development, we or our collaborators may be required to repeat some or all of the previously conducted trials or conduct additional bridging trials, which could increase our costs and delay or impede our ability to obtain marketing approval.

We expect our manufacturing strategy for one or more of our product candidates may involve the use of contract manufacturing organizations, or CMOs, as well as establishing our own capabilities and infrastructure, including a manufacturing facility. We believe that development of our own manufacturing facility will provide us with enhanced control of material supply for both clinical trials and the commercial market, enable the more rapid implementation of process changes and help us achieve better long-term margins. We have no experience in developing a manufacturing facility and may never be successful in developing our own manufacturing facility or capability. The facilities used by us and our contract manufacturers to manufacture therapeutic product candidates must be approved by the FDA pursuant to inspections that will be conducted after we submit our BLA to the FDA. We do not control the manufacturing process of, and are currently completely dependent on, our contract manufacturing partners for compliance with the regulatory requirements, known as

current good manufacturing practices, or cGMP, for the manufacture of our product candidates. We may establish multiple manufacturing facilities as we expand our commercial footprint to multiple geographies, which will be costly and time consuming and may lead to regulatory delays. Even if we are successful, our manufacturing capabilities could be affected by cost-overruns, potential problems with scale-out, process reproducibility, stability issues, lot inconsistency, timely availability of reagents or raw materials, unexpected delays, equipment failures, labor shortages, natural disasters, utility failures, regulatory issues and other factors that could prevent us from realizing the intended benefits of our manufacturing strategy and have a material adverse effect on our business.

The FDA, the EMA and other foreign regulatory authorities may require us to submit samples of any lot of any product that may receive approval together with the protocols showing the results of applicable tests at any time. Under some circumstances, the FDA, the EMA or other foreign regulatory authorities may require that we not distribute a lot until the relevant agency authorizes its release. Slight deviations in the manufacturing process, including those affecting quality attributes and stability, may result in unacceptable changes in the product that could result in lot failures or product recalls. Lot failures or product recalls could cause us or our collaborators to delay product launches or clinical trials, which could be costly to us and otherwise harm our business. Problems in our manufacturing process also could restrict our or our collaborators' ability to meet market demand for products.

Any problems in our manufacturing process or facilities could make us a less attractive collaborator for potential partners, including larger pharmaceutical companies and academic research institutions, which could limit our access to additional attractive development opportunities.

We will rely on donors of T cells to manufacture product candidates from our cancer immunotherapy platform, and if we do not obtain an adequate supply of T cells from qualified donors, development of those product candidates may be adversely impacted.

We are developing a pipeline of allogeneic T cell product candidates that are engineered from healthy donor T cells, which vary in type and quality. This variability in type and quality of a donor's T cells makes producing standardized product candidates more difficult and makes the development and commercialization pathway of those product candidates more uncertain. We have developed a screening process designed to enhance the quality and consistency of T cells used in the manufacture of our CAR T cell product candidates. If we are unable to identify and obtain T cells from donors that satisfy our criteria in sufficient quantity, to obtain such cells in a timely manner or to address variability in donor T cells, development of our CAR T cell product candidates may be delayed or there may be inconsistencies in the product candidates we produce, which could negatively impact development of such product candidates, harm our reputation and adversely impact our business and prospects.

Delays in completing the manufacturing facility we are building or failure to achieve operating efficiencies from it may require us to devote additional resources and management time to manufacturing operations and may delay our product development timelines.

We have leased approximately 17,300 square feet of space for our manufacturing facility at a location approximately seven miles from our headquarters in Durham, North Carolina, at which we intend to establish and equip a manufacturing facility compliant with cGMP. We may face delays in the completion of the manufacturing facility and cannot guarantee that this facility will be available for manufacturing beginning with our BCMA product candidate. In addition, we may not experience the anticipated operating efficiencies as we commence manufacturing operations at the new facility. Any such delays may disrupt or delay the supply of our product candidates if we have not maintained a sufficient back-up supply of such product candidates through third-party manufacturers. Moreover, changing manufacturing facilities may also require that we or our

collaborators conduct additional studies, make notifications to regulatory authorities, make additional filings to regulatory authorities, and obtain regulatory authority approval for the new facilities, which may be delayed or which we may never receive. We will further need to comply with the FDA's and applicable foreign regulatory authorities' cGMP requirements for the production of product candidates for clinical trials and, if approved, commercial supply, and will be subject to FDA and comparable foreign regulatory authority inspection. These requirements include the qualification and validation of our manufacturing equipment and processes. We may not be able to develop or acquire the internal expertise and resources necessary for compliance with these requirements. Should we fail to comply with cGMP requirements, the opening of our manufacturing facility will be delayed. If we fail to achieve the operating efficiencies that we anticipate, our manufacturing and operating costs may be greater than expected, which could have a material adverse impact on our operating results.

In order to complete our planned manufacturing facility, we may be forced to devote greater resources and management time than anticipated, particularly in areas relating to operations, quality, regulatory, facilities and information technology. We also may encounter problems hiring and retaining the experienced scientific, quality-control and manufacturing personnel needed to operate our manufacturing processes. If we experience unanticipated employee shortage or turnover in any of these areas, we may not be able to effectively manage our ongoing manufacturing operations and we may not achieve the operating efficiencies that we anticipate from the new facility, which may negatively affect our product development timeline or result in difficulties in maintaining compliance with applicable regulatory requirements.

Any such problems could result in the delay, prevention or impairment of clinical development and commercialization of our product candidates.

We or our collaborators may experience delays or difficulties in enrolling patients in clinical trials, which could delay or prevent receipt of regulatory approvals.

We or our collaborators may not be able to initiate or continue clinical trials on a timely basis or at all for any product candidates we or our collaborators identify or develop if we or our collaborators are unable to locate and enroll a sufficient number of eligible patients to participate in the trials as required by applicable regulations or as needed to provide appropriate statistical power for a given trial. Additionally, some of our competitors may have ongoing clinical trials for product candidates that would treat the same indications as one or more of our product candidates, and patients who would otherwise be eligible for our clinical trials may instead enroll in our competitors' clinical trials.

Patient enrollment may also affected by many factors, including:

- severity and difficulty of diagnosing of the disease under investigation;
- size of the patient population and process for identifying subjects;
- eligibility and exclusion criteria for the trial in question;
- our or our collaborators' ability to recruit clinical trial investigators with the appropriate competencies and experience;
- design of the trial protocol;
- availability and efficacy of approved medications or therapies, or other clinical trials, for the disease or condition under investigation;
- perceived risks and benefits of the product candidate under trial or testing, or of the application of genome editing to human indications;

- availability of genetic testing for potential patients;
- efforts to facilitate timely enrollment in clinical trials;
- patient referral practices of physicians;
- ability to obtain and maintain subject consent;
- risk that enrolled subjects will drop out before completion of the trial;
- ability to monitor patients adequately during and after treatment; and
- proximity and availability of clinical trial sites for prospective patients.

We expect that some of our product candidates will focus on rare genetically defined diseases with limited patient pools from which to draw for enrollment in clinical trials. The eligibility criteria of our clinical trials will further limit the pool of available trial participants. In addition to the factors identified above, patient enrollment in any clinical trials we or our collaborators may conduct may be adversely impacted by any negative outcomes our competitors may experience, including adverse side effects, clinical data showing inadequate efficacy or failures to obtain regulatory approval.

Furthermore, our or our collaborators' ability to successfully initiate, enroll and conduct a clinical trial outside the United States is subject to numerous additional risks, including:

- difficulty in establishing or managing relationships with CROs and physicians;
- differing standards for the conduct of clinical trials;
- differing standards of care for patients with a particular disease;
- an inability to locate qualified local consultants, physicians and partners; and
- the potential burden of complying with a variety of foreign laws, medical standards and regulatory requirements, including the regulation of pharmaceutical and biotechnology products and treatments.

Enrollment delays in clinical trials may result in increased development costs for any of our product candidates, which may cause the value of our company to decline and limit our ability to obtain additional financing. If we or our collaborators have difficulty enrolling a sufficient number of patients to conduct clinical trials as planned, we may need to delay, limit or terminate ongoing or planned clinical trials, any of which may have an adverse effect on our results of operations and prospects.

Results of preclinical studies and early clinical trials of product candidates may not be predictive of results of later studies or trials. Our product candidates may not have favorable results in later clinical trials, if any, or receive regulatory approval.

Preclinical and clinical drug development is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the preclinical study or clinical trial process. Despite promising preclinical or clinical results, any product candidate can unexpectedly fail at any stage of preclinical or clinical development. The historical failure rate for product candidates in our industry is high.

The results from preclinical studies or early clinical trials of a product candidate may not be predictive of the results from later preclinical studies or clinical trials, and interim results of a clinical trial are not necessarily indicative of final results. Product candidates in later stages of clinical trials may fail to show the desired safety and efficacy characteristics despite having progressed through preclinical studies and initial clinical trials. Many companies in the biopharmaceutical and biotechnology industries have suffered significant setbacks at later

stages of development after achieving positive results in early stages of development, and we may face similar setbacks. These setbacks have been caused by, among other things, preclinical findings made while clinical trials were underway or safety or efficacy observations made in clinical trials, including previously unreported adverse events. Moreover, non-clinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that believed their product candidates performed satisfactorily in preclinical studies and clinical trials nonetheless failed to obtain regulatory approval. The use of our genome editing technology in our product candidates has never undergone testing in humans and has only been tested in a limited manner in animals, and results from animal studies may not be predictive of clinical trial results. Even if any product candidates progress to clinical trials, these product candidates may fail to show the safety and efficacy in clinical development required to obtain regulatory approval, despite the observation of positive results in animal studies. Our or our collaborators' failure to replicate positive results from early research programs and preclinical or greenhouse studies may prevent us from further developing and commercializing those or other product candidates, which would limit our potential to generate revenues from them and harm our business and prospects.

For the foregoing reasons, we cannot be certain that any ongoing or future preclinical studies or clinical trials will be successful. Any safety or efficacy concerns observed in any one of our preclinical studies or clinical trials in a targeted area could limit the prospects for regulatory approval of product candidates in that and other areas, which could have a material adverse effect on our business and prospects.

If any of our product candidates do not work as intended or cause undesirable side effects, it could hinder or prevent receipt of regulatory approval or realization of commercial potential for them or our other product candidates and could substantially harm our business.

Our product candidates may be associated with off-target editing or other serious adverse events, undesirable side effects or unexpected characteristics. Results of clinical trials could reveal severe or recurring side effects, toxicities or unexpected events, including death. Off-target cuts could lead to disruption of a gene or a genetic regulatory sequence at an unintended site in the DNA. In those instances where we also provide a segment of DNA, it is possible that following off-target cut events, such DNA could be integrated into the genome at an unintended site, potentially disrupting another important gene or genomic element. There may also be delayed adverse events following exposure to therapeutics made with genome editing technologies due to persistent biologic activity of the genetic material or other components of products used to carry the genetic material. In addition to serious adverse events or side effects caused by product candidates we develop alone or with collaborators, the administration process or related procedures may also cause undesirable side effects. Any side effects may not be appropriately recognized or managed by the treating medical staff. We or our collaborators expect to have to train medical personnel using any product candidates we may develop to understand the side effect profiles for our clinical trials and upon any commercialization of such product candidates. Inadequate training in recognizing or managing the potential side effects of such product candidates could result in patient injury or death.

If any such events occur, clinical trials or commercial distribution of any product candidates or products we develop alone or with collaborators could be suspended or terminated, and our business and reputation could suffer substantial harm. Treatment-related side effects could affect patient recruitment and the ability of enrolled patients to complete the trial or result in potential liability claims. Regulatory authorities could order us or our collaborators to cease further development of, deny approval of or require us to cease selling any product candidates or products for any or all targeted indications. If we or our collaborators elect, or are required, to delay, suspend or terminate any clinical trial or commercialization efforts, the commercial prospects of such product candidates or products may be harmed, and our ability to generate product revenues from them or other product candidates that we develop may be delayed or eliminated.

Additionally, if we successfully develop a product candidate alone or with collaborators and it receives marketing approval, the FDA could require us to adopt a REMS to ensure that the benefits of treatment with such product candidate outweigh the risks for each potential patient, which may include, among other things, a communication plan to health care practitioners, patient education, extensive patient monitoring or distribution systems and processes that are highly controlled, restrictive and more costly than what is typical for the industry. We or our collaborators may also be required to adopt a REMS or engage in similar actions, such as patient education, certification of health care professionals or specific monitoring, if we or others later identify undesirable side effects caused by any product that we develop alone or with collaborators. Such identification could also have several additional significant negative consequences, such as:

- regulatory authorities may suspend, withdraw or limit approvals of such product, or seek an injunction against its manufacture or distribution;
- regulatory authorities may require additional warnings on the label, including “boxed” warnings, or issue safety alerts, Dear Healthcare Provider letters, press releases or other communications containing warnings or other safety information about the product;
- we may be required to create a medication guide outlining the risks of such side effects for distribution to patients;
- we may be required to change the way a product is administered or conduct additional trials;
- the product may become less competitive;
- we or our collaborators may decide to remove the product from the marketplace;
- we may be subject to fines, injunctions or the imposition of civil or criminal penalties;
- we could be sued and be held liable for harm caused to patients; and
- our reputation may suffer.

Any of these events could prevent us or our collaborators from achieving or maintaining market acceptance of any potential product.

We are subject to federal, state and non-U.S. healthcare and privacy laws and regulations relating to our business, and could face substantial penalties if we are determined not to have fully complied with such laws, which would have an adverse impact on our business.

Our business operations, as well as our current and anticipated future arrangements with investigators, healthcare professionals, consultants, third-party payors, customers and patients, expose or will expose us to broadly applicable foreign, federal, and state fraud and abuse and other healthcare and privacy laws and regulations. These laws constrain the business or financial arrangements and relationships through which we conduct our operations, including how we research, market, sell and distribute any potential products for which we may obtain marketing approval. Such laws include:

- the U.S. federal Anti-Kickback Statute, which prohibits, among other things, persons and entities from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made under a U.S. healthcare program such as Medicare and Medicaid. A person or entity does not need to have actual knowledge of the U.S. federal Anti-Kickback Statute or specific intent to violate it in order to have committed a violation. In addition, the government may assert that a claim including items or services resulting from a violation of the

U.S. federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act;

- U.S. federal civil and criminal false claims laws and civil monetary penalties laws, including the civil False Claims Act, which can be enforced through civil whistleblower or qui tam actions, prohibits, among other things, individuals and entities from knowingly presenting, or causing to be presented, to the U.S. government, claims for payment or approval that are false or fraudulent, knowingly making, using or causing to be made or used, a false record or statement material to a false or fraudulent claim, or from knowingly making a false statement to avoid, decrease or conceal an obligation to pay money to the U.S. government;
- the U.S. Health Insurance Portability and Accountability Act of 1996, or HIPAA, which imposes criminal and civil liability for, among other things, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, including private third-party payors, or knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statement, in connection with the delivery of, or payment for, healthcare benefits, items or services. Similar to the U.S. federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation.
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, or HITECH, and their implementing regulations, impose obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information without appropriate authorization by covered entities subject to the rule, such as health plans, healthcare clearinghouses and certain healthcare providers, as well as their business associates that perform certain services for or on their behalf involving the use or disclosure of individually identifiable health information;
- the U.S. Physician Payments Sunshine Act, which requires certain manufacturers of drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to report annually to CMS information related to payments or other "transfers of value" made to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, and requires applicable manufacturers and group purchasing organizations to report annually to the Centers for Medicare and Medicaid Services, or CMS, ownership and investment interests held by the physicians described above and their immediate family members; and
- analogous state and non-U.S. laws and regulations, such as state anti-kickback and false claims laws, which may apply to our business practices, including, but not limited to, research, distribution, sales and marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers, or by the patients themselves; state laws that require pharmaceutical and device companies to comply with the industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the U.S. government, or otherwise restrict payments that may be made to healthcare providers and other potential referral sources; state laws and regulations that require manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures and pricing information; state and local laws which require the registration of pharmaceutical sales representatives; state and non-U.S. laws governing the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA; state and non-U.S., enacted and proposed, laws and regulations regarding the collection, distribution, use, security, and storage of personally identifiable information and other data relating to individuals (including the EU General Data Protection Regulation 2016/679 and the California Consumer Protection Act); and federal and state consumer protection laws are

being applied to enforce regulations related to the online collection, use, and dissemination of data, thus complicating compliance efforts.

Efforts to ensure that our current and future business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities may conclude that our business practices do not comply with current or future statutes, regulations, agency guidance or case law involving applicable healthcare laws. If our operations are found to be in violation of any of these or any other health regulatory laws that may apply to us, we may be subject to significant penalties, including the imposition of significant civil, criminal and administrative penalties, damages, monetary fines, disgorgement, individual imprisonment, possible exclusion from participation in Medicare, Medicaid and other U.S. healthcare programs, additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, contractual damages, reputational harm, diminished profits and future earnings, and curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations. Defending against any such actions can be costly, time-consuming and may require significant financial and personnel resources. Therefore, even if we are successful in defending against any such actions that may be brought against us, our business may be impaired. If any of the above occur, it could adversely affect our ability to operate our business and our results of operations.

We may seek orphan drug designation for some or all of our product candidates, but we may be unable to obtain such designations or to maintain the benefits associated with orphan drug designation, which may negatively impact our ability to develop or obtain regulatory approval for such product candidates and may reduce our revenue if we obtain such approval.

We may seek orphan drug designation for some or all of our product candidates in specific orphan indications in which there is a medically plausible basis for the use of these products. Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biologic intended to treat a rare disease or condition, defined as a disease or condition with a patient population of fewer than 200,000 in the United States, or a patient population greater than 200,000 in the United States when there is no reasonable expectation that the cost of developing and making available the drug or biologic in the United States will be recovered from sales in the United States for that drug or biologic. Orphan drug designation must be requested before submitting a biologics license application, or BLA. In the United States, orphan drug designation entitles a party to financial incentives such as opportunities for grant funding towards clinical trial costs, tax advantages and user-fee waivers. After the FDA grants orphan drug designation, the generic identity of the drug and its potential orphan use are disclosed publicly by the FDA. Orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review and approval process. Although we may seek orphan product designation for some or all of our product candidates, we may never receive such designations.

If a product that has orphan drug designation subsequently receives the first FDA approval for a particular active ingredient for the disease for which it has such designation, the product is entitled to orphan product exclusivity, which means that the FDA may not approve any other applications, including a BLA, to market the same biologic for the same indication for seven years, except in limited circumstances such as a showing of clinical superiority to the product with orphan product exclusivity or if FDA finds that the holder of the orphan drug exclusivity has not shown that it can ensure the availability of sufficient quantities of the orphan drug to meet the needs of patients with the disease or condition for which the drug was designated. Even if we or our collaborators obtain orphan drug designation for a product candidate, we may not be the first to obtain marketing approval for any particular orphan indication due to the uncertainties associated with developing pharmaceutical products. Exclusive marketing rights in the United States may be limited if we or our collaborators seek approval for an indication broader than the orphan designated indication and may be lost if the FDA later determines that the request for designation was materially defective or if the manufacturer is

unable to assure sufficient quantities of the product to meet the needs of patients with the rare disease or condition. Further, even if a product obtains orphan drug exclusivity, that exclusivity may not effectively protect the product from competition because different drugs with different active moieties can be approved for the same condition. Even after an orphan drug is approved, the FDA can subsequently approve the same drug with the same active moiety for the same condition if the FDA concludes that the later drug is safer, more effective, or makes a major contribution to patient care. Furthermore, the FDA can waive orphan exclusivity if we or our collaborators are unable to manufacture sufficient supply of the product.

Similarly, in Europe, a medicinal product may receive orphan designation under Article 3 of Regulation (EC) 141/2000. This applies to products that are intended for a life-threatening or chronically debilitating condition and either (1) such condition affects no more than five in 10,000 persons in the EU when the application is made, or (2) the product, without the benefits derived from orphan status, would be unlikely to generate sufficient returns in the EU to justify the necessary investment. Moreover, in order to obtain orphan designation in the EU it is necessary to demonstrate that there exists no satisfactory method of diagnosis, prevention or treatment of such condition authorized for marketing in the EU or, if such a method exists, the product will be of significant benefit to those affected by the condition. In the EU, orphan medicinal products are eligible for financial incentives such as reduction of fees or fee waivers and applicants can benefit from specific regulatory assistance and scientific advice. Products receiving orphan designation in the EU can receive 10 years of market exclusivity, during which time no similar medicinal product for the same indication may be placed on the market. An orphan product can also obtain an additional two years of market exclusivity in the EU for pediatric studies. However, the 10-year market exclusivity may be reduced to six years if, at the end of the fifth year, it is established that the product no longer meets the criteria for orphan designation—for example, if the product is sufficiently profitable not to justify maintenance of market exclusivity. Additionally, marketing authorization may be granted to a similar product for the same indication at any time if:

- the second applicant can establish that its product, although similar, is safer, more effective or otherwise clinically superior;
- the first applicant consents to a second orphan medicinal product application; or
- the first applicant cannot supply enough orphan medicinal product.

If we or our collaborators do not receive or maintain orphan drug designation for product candidates for which we seek such designation, it could limit our ability to realize revenues from such product candidates.

We may seek fast-track designation for some or all of our product candidates, but we may not receive such designation, and even if we do, it may not lead to a faster development or regulatory review or approval process, and will not increase the likelihood that such product candidates will receive marketing approval.

We may seek fast-track designation and review for some or all of our product candidates. If a drug is intended for the treatment of a serious or life-threatening condition or disease, and nonclinical or clinical data demonstrate the potential to address an unmet medical need, the product may qualify for FDA fast track designation, for which sponsors must apply. The FDA has broad discretion whether or not to grant this designation. Thus, even if we or our collaborators believe a particular product candidate is eligible for this designation, the FDA may decide not to grant it. Moreover, even if we do receive fast track designation, we or our collaborators may not experience a faster development process, review or approval compared to conventional FDA procedures. In addition, the FDA may withdraw fast track designation if it believes that the designation is no longer supported by data from the clinical development program.

If the product candidates that we or our collaborators may develop receive regulatory approval in the United States or another jurisdiction, they may never receive approval in other jurisdictions, which would limit market opportunities for such product candidate and adversely affect our business.

Approval of a product candidate in the United States by the FDA or by the requisite regulatory agencies in any other jurisdiction does not ensure approval of such product candidate by regulatory authorities in other countries or jurisdictions. The approval process varies among countries and may limit our or our collaborators' ability to develop, manufacture, promote and sell product candidates internationally. Failure to obtain marketing approval in international jurisdictions would prevent the product candidates from being marketed outside of the jurisdictions in which regulatory approvals have been received. In order to market and sell product candidates in the EU and many other jurisdictions, we and our collaborators must obtain separate marketing approvals and comply with numerous and varying regulatory requirements. The approval procedure varies among countries and may involve additional preclinical studies or clinical trials both before and after approval. In many countries, any product candidate for human use must be approved for reimbursement before it can be approved for sale in that country. In some cases, the intended price for such product is also subject to approval. Further, while regulatory approval of a product candidate in one country does not ensure approval in any other country, a failure or delay in obtaining regulatory approval in one country may have a negative effect on the regulatory approval process in others. If we or our collaborators fail to comply with the regulatory requirements in international markets or to obtain all required marketing approvals, the target market for a particular potential product will be reduced, which would limit our ability to realize the full market potential for the product and adversely affect our business.

Recently enacted and future legislation may increase the difficulty and cost for us to obtain marketing approval of and commercialize any product candidates we or our collaborators develop and may adversely affect the prices for such product candidates.

In the United States and certain non-U.S. jurisdictions, there have been, and we expect there will continue to be, a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could, among other things, prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our or our collaborators' ability to profitably sell any product candidates that obtain marketing approval.

For example, in March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, collectively the Affordable Care Act, was enacted in the United States. Among the provisions of the Affordable Care Act of importance to our product candidates, the Affordable Care Act establishes an annual, nondeductible fee on any entity that manufactures or imports specified branded prescription drugs and biologic agents; increases in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program, extends manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations, expands eligibility criteria for Medicaid programs, expansion of the entities eligible for discounts under the Public Health program, addresses a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected, creates a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% (and 70% commencing January 1, 2019) point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D, and creates a licensure framework for follow-on biologic products.

At this time, we are unsure of the full impact that the Affordable Care Act will have on our business. There have been judicial and political challenges to certain aspects of the Affordable Care Act. For example, since January 2017, President Trump has signed two executive orders and other directives designed to delay, circumvent, or

loosen certain requirements mandated by the Affordable Care Act. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the Affordable Care Act. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the Affordable Care Act have been signed into law. Tax legislation enacted on December 22, 2017 entitled "an Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018, Pub.L. 115–97," or the Tax Cuts and Jobs Act of 2017, includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the Affordable Care Act on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate." Additionally, on January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain Affordable Care Act-mandated fees, including the so-called "Cadillac" tax on certain high cost employer-sponsored insurance plans, the annual fee imposed on certain health insurance providers based on market share. Further, the Bipartisan Budget Act of 2018, among other things, amends the Affordable Care Act, effective January 1, 2019, to close the coverage gap in most Medicare drug plans, commonly referred to as the "donut hole." More recently, in July 2018, the CMS published a final rule permitting further collections and payments to and from certain Affordable Care Act qualified health plans and health insurance issuers under the Affordable Care Act risk adjustment program in response to the outcome of federal district court litigation regarding the method CMS uses to determine this risk adjustment. Congress may consider other legislation to repeal or repeal and replace other elements of the Affordable Care Act.

In addition, other legislative changes have been proposed and adopted since the Affordable Care Act was enacted. On August 2, 2011, the Budget Control Act of 2011 was signed into law, which, among other things, created the Joint Select Committee on Deficit Reduction to recommend to Congress proposals for spending reductions. The Joint Select Committee did not achieve a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, triggering the legislation's automatic reduction to several government programs. This includes reductions to Medicare payments to providers of 2% per fiscal year, which went into effect on April 1, 2013 and, due to subsequent legislative amendments to the statute, including the BBA, will remain in effect through 2027 unless additional Congressional action is taken. On January 2, 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, reduced Medicare payments to several providers, including hospitals, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

Further, there has been heightened governmental scrutiny recently over pharmaceutical pricing practices in light of the rising cost of prescription drugs and biologics. Such scrutiny has resulted in several recent Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for pharmaceutical products, some of which are included in the Trump administration's budget proposal for fiscal year 2019. Additionally, the Trump administration released a "Blueprint" to lower drug prices and reduce out of pocket costs of drugs that contains additional proposals to increase manufacturer competition, increase the negotiating power of certain federal healthcare programs, incentivize manufacturers to lower the list price of their products and reduce the out of pocket costs of drug products paid by consumers. The U.S. Department of Health and Human Services has begun the process of soliciting feedback on some of these measures and, at the same, is immediately implementing others under its existing authority. Although a number of these, and other potential, proposed measures will require authorization through additional legislation to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical product and medical device pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access

and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. In addition, regional healthcare authorities and individual hospitals are increasingly using bidding procedures to determine what pharmaceutical products and medical devices to purchase and which suppliers will be included in their prescription drug and other healthcare programs.

Additionally, on May 30, 2018, the Trickett Wendler, Frank Mongiello, Jordan McLinn, and Matthew Bellina Right to Try Act of 2017, or the Right to Try Act, was signed into law. The law, among other things, provides a federal, or the framework for certain patients with life-threatening diseases or conditions to access certain investigational new drug products that have completed a Phase 1 clinical trial and that are undergoing investigation for FDA approval. Under certain circumstances, eligible patients can seek treatment without enrolling in clinical trials and without obtaining FDA permission under the FDA expanded access program. There is no obligation for a drug manufacturer to make its drug products available to eligible patients as a result of the Right to Try Act.

We expect that the Affordable Care Act, as well as other healthcare reform measures that may be adopted in the future, may result in more rigorous coverage criteria, new payment methodologies and in additional downward pressure on the price that we or our collaborators may receive for any approved or cleared product. Any reduction in reimbursement from Medicare or other government programs may result in a similar reduction in payments from private payors. We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative action, either in the United States or abroad. If we or our collaborators are slow or unable to adapt to new requirements or policies, or if we or our collaborators are not able to maintain regulatory compliance, any of our product candidates may lose any regulatory approval that may have been obtained and we may not achieve or sustain profitability, which would adversely affect our business.

Even if we obtain regulatory approval for any products that we develop alone or with collaborators, such products will remain subject to ongoing regulatory requirements, which may result in significant additional expense.

Even if products we develop alone or with collaborators receive regulatory approval, they will be subject to ongoing regulatory requirements for manufacturing, labeling, packaging, distribution, storage, advertising, promotion, sampling, record-keeping and submission of safety and other post-market information, among other things. Any regulatory approvals received for such products may also be subject to limitations on the approved indicated uses for which they may be marketed or to the conditions of approval, or contain requirements for potentially costly post-marketing testing and surveillance studies. For example, the holder of an approved BLA in the United States is obligated to monitor and report adverse events and any failure of a product to meet the specifications in the BLA. FDA guidance advises that patients treated with some types of gene therapy undergo follow-up observations for potential adverse events for as long as 15 years. Similarly, in the EU, pharmacovigilance obligations are applicable to all medicinal products. In addition to those, holders of a marketing authorization for gene or cell therapy products must detail, in their application, the measures they envisage to ensure follow-up of the efficacy and safety of these products. In cases of particular concern, marketing authorization holders for gene or cell therapy products in the EU may be required to design a risk management system with a view to identifying, preventing or minimizing risks and may be obliged to carry out post-marketing studies. In the United States, the holder of an approved BLA must also submit new or supplemental applications and obtain FDA approval for certain changes to the approved product, product labeling or manufacturing process. Similar provisions apply in the EU. Advertising and promotional materials must comply with FDA rules and are subject to FDA review, in addition to other potentially applicable federal and state laws. Similarly, in the EU any promotion of medicinal products is highly regulated and, depending on the specific jurisdiction involved, may require prior vetting by the competent national regulatory authority.

In addition, product manufacturers and their facilities are subject to payment of user fees and continual review and periodic inspections by the FDA and other regulatory authorities for compliance with cGMP requirements and adherence to commitments made in the BLA or foreign marketing application. If we, our collaborators or a regulatory agency discovers previously unknown problems with a product such as adverse events of unanticipated severity or frequency or problems with the facility where the product is manufactured or disagrees with the promotion, marketing or labeling of that product, a regulatory agency may impose restrictions relative to that product, the manufacturing facility or us or our collaborators, including requiring recall or withdrawal of the product from the market or suspension of manufacturing.

Moreover, if any of our product candidates are approved, our product labeling, advertising, promotion and distribution will be subject to regulatory requirements and continuing regulatory review. The FDA strictly regulates the promotional claims that may be made about drug products. In particular, a product may not be promoted for uses that are not approved by the FDA as reflected in the product's approved labeling.

If we or our collaborators fail to comply with applicable regulatory requirements following approval of any potential products we may develop, authorities may:

- issue an untitled enforcement letter or a warning letter asserting a violation of the law;
- seek an injunction, impose civil and criminal penalties, and impose monetary fines, restitution or disgorgement of profits or revenues;
- suspend or withdraw regulatory approval;
- suspend or terminate any ongoing clinical trials or implement requirements to conduct post-marketing studies or clinical trials;
- refuse to approve a pending BLA or comparable foreign marketing application (or any supplements thereto) submitted by us or our collaborators;
- restrict the labeling, marketing, distribution, use or manufacturing of products;
- seize or detain products or otherwise require the withdrawal or recall of products from the market;
- refuse to approve pending applications or supplements to approved applications that we or our collaborators submit;
- refuse to permit the import or export of products; or
- refuse to allow us or our collaborators to enter into government contracts.

Any government investigation of alleged violations of law could require us to expend significant time and resources in response and could generate negative publicity. The occurrence of any event or penalty described above may inhibit our or our collaborators' ability to commercialize products and our ability to generate revenues.

In addition, the FDA's policies, and policies of foreign regulatory agencies, may change, and additional regulations may be enacted that could prevent, limit or delay regulatory approval of product candidates. For example, in December 2016, the 21st Century Cures Act, or the Cures Act, was signed into law. The Cures Act, among other things, is intended to modernize the regulation of biologics and spur innovation, but its ultimate implementation is unclear. We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative or executive action, either in the United States or abroad. For example, certain policies of the Trump administration may impact our business and industry. Namely, the

Trump administration has taken several executive actions, including the issuance of a number of Executive Orders, that could impose significant burdens on, or otherwise materially delay, the FDA's ability to engage in routine oversight activities such as implementing statutes through rulemaking, issuance of guidance and review and approval of marketing applications. It is difficult to predict how these requirements will be implemented, and the extent to which they will impact the FDA's ability to exercise its regulatory authority. If these executive actions impose restrictions on the FDA's ability to engage in oversight and implementation activities in the normal course, our business may be negatively impacted. If we or our collaborators are slow or unable to adapt to changes in existing requirements or the adoption of new requirements, or if we or our collaborators are unable to maintain regulatory compliance, marketing approval that has been obtained may be lost and we may not achieve or sustain profitability.

Even if any product we develop alone or with collaborators receives marketing approval, such product may fail to achieve the degree of market acceptance by physicians, patients, healthcare payors and others in the medical community necessary for commercial success.

The commercial success of any potential therapeutic products we develop alone or with collaborators will depend upon their degree of market acceptance by physicians, patients, third-party payors and others in the medical community. Even if any potential therapeutic products we develop alone or with collaborators receive marketing approval, they may nonetheless fail to gain sufficient market acceptance by physicians, patients, healthcare payors and others in the medical community. The degree of market acceptance of any product we develop alone or with collaborators, if approved for commercial sale, will depend on a number of factors, including:

- the efficacy and safety of such product as demonstrated in clinical trials;
- the prevalence and severity of any side effects;
- the clinical indications for which the product is approved by FDA, the EMA or other regulatory authorities;
- product labeling or product insert requirements of the FDA, the EMA or other regulatory authorities, including any limitations or warnings contained in a product's approved labeling;
- public attitudes regarding genome editing technologies;
- our and any collaborators' ability to educate the medical community about the safety and effectiveness of the product;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies, as well as their willingness to accept a therapeutic intervention that involves the editing of the patient's genome;
- the potential and perceived advantages compared to alternative treatments;
- convenience and ease of administration compared to alternative treatments;
- any restrictions on the use of such product together with other treatments or products;
- market introduction of competitive products;
- publicity concerning such product or competing products and treatments;
- the ability to offer such product for sale at a competitive price;

- the strength of marketing and distribution support; and
- sufficient third-party coverage and adequate reimbursement.

If any products we develop alone or with collaborators do not achieve an adequate level of acceptance, we may not generate significant product revenues, and we may not become profitable.

If we are unable to establish sales and marketing capabilities or enter into agreements with third parties to sell and market any products we develop alone or with collaborators, the commercialization of such products may not be successful if and when they are approved.

We do not have a sales or marketing infrastructure and have no experience in the sale, marketing or distribution of biopharmaceutical or other commercial products. To achieve commercial success for any approved products for which we retain sales and marketing responsibilities, we must either develop a sales and marketing organization or outsource these functions to third parties. In the future, we may choose to build a focused sales, marketing and commercial support infrastructure to sell, or participate in sales activities with our collaborators for, certain product candidates if and when they are approved.

There are risks involved with both establishing our own commercial capabilities and entering into arrangements with third parties to perform these services. For example, restricted or closed distribution channels may make it difficult to distribute products to segments of the patient population, and the lack of complementary medicines to be offered by sales personnel may put us at a competitive disadvantage relative to companies with more extensive product lines.

Recruiting and training a sales force or reimbursement specialists are expensive and time consuming and could delay any product launch. If the commercial launch of a product for which we recruit a sales force and establish marketing and other commercialization capabilities is delayed or does not occur for any reason, we would have prematurely or unnecessarily incurred these commercialization expenses, and our investment would be lost if we cannot retain or reposition our commercialization personnel. Factors that may inhibit our efforts to commercialize products on our own include:

- unforeseen costs and expenses associated with creating an independent commercialization organization;
- our inability to recruit, train, retain and effectively manage adequate numbers of effective sales, marketing, customer service and other support personnel, including for reimbursement or medical affairs;
- the inability of sales personnel to obtain access to physicians or persuade adequate numbers of physicians to prescribe any future medicines; and
- the inability of reimbursement professionals to negotiate arrangements for formulary access, reimbursement and other acceptance by payors.

If we choose to enter into arrangements with third parties to perform sales, marketing, commercial support or distribution services, we may not be successful in entering into such arrangements or may be unable to do so on terms that are favorable to us. Entering into such third-party arrangements may subject us to a variety of risks, including:

- product revenues or profitability to us being lower than if we were to market and sell any products we or our collaborators may develop ourselves;
- our inability to exercise direct control over sales and marketing activities and personnel;
- failure of the third parties to devote necessary resources and attention to, or other inability to, sell and market any products we or our collaborators may develop;

- potential disputes with third parties concerning sales and marketing expenses, calculation of royalties and sales and marketing strategies; and
- unforeseen costs and expenses associated with sales and marketing.

If we do not establish effective commercialization capabilities, either on our own or in collaboration with third parties, we will not be successful in commercializing any of our product candidates that may receive approval.

If the market opportunities for any products we develop alone or with collaborators are smaller than our estimates, or if we are unable to successfully identify enough patients, our revenues may be adversely affected.

We focus some of our research and product development on treatments for rare genetic diseases. Our and our collaborators' projections of both the number of people who have these diseases, as well as the subset of people with these diseases who have the potential to benefit from treatment with product candidates we may develop, are based on estimates. These estimates may prove to be incorrect, and new studies may change the estimated incidence or prevalence of these diseases. The number of patients in the United States, Europe and elsewhere may turn out to be lower than expected, and patients may not be amenable to treatment with products that we may develop alone or with collaborators, or may become increasingly difficult to identify or gain access to, any of which would decrease our ability to realize revenue from any such products for such diseases.

The successful commercialization of potential products will depend in part on the extent to which governmental authorities and health insurers establish coverage, and the adequacy of reimbursement levels and pricing policies, and failure to obtain or maintain coverage and adequate reimbursement for any potential products that may receive approval, could limit marketability of those products and decrease our ability to generate revenue.

The availability of coverage and adequacy of reimbursement by government healthcare programs such as Medicare and Medicaid, private health insurers and other third-party payors is essential for most patients to be able to afford prescription medications such as the potential therapeutic products we develop alone or with collaborators. The ability to achieve acceptable levels of coverage and reimbursement for any potential products that may be approved by governmental authorities will have an effect on our and our collaborators' ability to successfully commercialize such products. Even if products we develop alone or with collaborators obtain coverage by a third-party payor, the resulting reimbursement payment rates may not be adequate or may require co-payments that patients find unacceptably high. If coverage and reimbursement in the United States, the EU or elsewhere is not available for any products we develop alone or with collaborators that may be approved, or any reimbursement that may become available is decreased or eliminated in the future, we and our collaborators may be unable to commercialize such products.

There is significant uncertainty related to the insurance coverage and reimbursement of newly approved drugs and biologics. In the United States, third-party payors, including private and governmental payors, such as the Medicare and Medicaid programs, play an important role in determining the extent to which new drugs and biologics will be covered. The Medicare and Medicaid programs increasingly are used as models in the United States for how private payors and other governmental payors develop their coverage and reimbursement policies for drugs and biologics. Some third-party payors may require pre-approval of coverage for new or innovative devices or drug therapies before they will reimburse healthcare providers who use such therapies. We cannot predict at this time what third-party payors will decide with respect to the coverage and reimbursement for any product that we develop alone or with collaborators.

No uniform policy for coverage and reimbursement for products exists among third-party payors in the United States. Therefore, coverage and reimbursement for products can differ significantly from payor to payor. As a

result, the coverage determination process is often a time-consuming and costly process that will require us or our collaborators to provide scientific and clinical support for the use of any potential products that may be approved to each payor separately, with no assurance that coverage and adequate reimbursement will be applied consistently or obtained in the first instance. Furthermore, rules and regulations regarding reimbursement change frequently, in some cases on short notice. Obtaining coverage and adequate reimbursement for products we develop alone or with collaborators may be particularly difficult because of the higher prices often associated with drugs administered under the supervision of a physician. In certain instances, payors may not separately reimbursement for the product itself, but only for the treatments or procedures in which such product is used. A decision by a third-party payor not to cover or separately reimburse for products that we develop alone or with collaborators or procedures using such products, could reduce physician utilization of any such products that may receive approval.

Third-party payors are increasingly challenging prices charged for pharmaceutical products and services, and many third-party payors may refuse to provide coverage and reimbursement for particular drugs or biologics when an equivalent generic drug, biosimilar or a less expensive therapy is available. If approved, it is possible that a third-party payor may consider any products that we develop alone or with collaborators as substitutable and only offer to reimburse patients for the less expensive product. Pricing of existing third-party therapeutics may limit the amount we will be able to charge for any products that may receive approval even if we or our collaborators show improved efficacy or improved convenience of administration such products. These payors may deny or revoke the reimbursement status of a given product or establish prices for new or existing marketed products at levels that are too low to enable us to realize an appropriate return on our investment in the product. If reimbursement is not available or is available only at limited levels, we or our collaborators may not be able to successfully commercialize any of the products that we develop, even if approved, and we may not be able to obtain a satisfactory financial return on them. Moreover, increasing efforts by governmental and third-party payors in the United States and abroad to cap or reduce healthcare costs may cause such organizations to limit both coverage and the level of reimbursement for newly approved products and, as a result, they may not cover or provide adequate payment for any products we develop alone or with collaborators that may receive approval. We expect to experience pricing pressures in connection with the sale of any products that may receive approval due to the trend toward managed health care, the increasing influence of health maintenance organizations and additional legislative changes. The downward pressure on healthcare costs in general, particularly prescription drugs and biologics and surgical procedures and other treatments, has become intense. As a result, increasingly high barriers are being erected to the entry of new products.

Outside the United States, international operations are generally subject to extensive governmental price controls and other market regulations, and we believe the increasing emphasis on cost-containment initiatives in Europe and elsewhere have and will continue to put pressure on the pricing and usage of any products we develop alone or with collaborators that may receive approval. In many countries, the prices of medical products are subject to varying price control mechanisms as part of national health systems. Other countries allow companies to fix their own prices for medical products, but monitor and control company profits. Additional international price controls or other changes in pricing regulation could restrict the amount that we or our collaborators are able to charge for products that we develop that may receive approval. Accordingly, in markets outside the United States, the reimbursement for such products may be reduced compared with the United States and may be insufficient to generate commercially reasonable revenue and profits.

Our product candidates for which we intend to seek approval as biologic products may face competition sooner than anticipated.

If we are successful in achieving regulatory approval to commercialize any biologic product candidate we develop alone or with collaborators, it may face competition from biosimilar products. In the United States, our

product candidates are regulated by the FDA as biologic products subject to approval under the BLA pathway. The Biologics Price Competition and Innovation Act of 2009, or the BPCIA, created an abbreviated pathway for the approval of biosimilar and interchangeable biologic products following the approval of an original BLA. The abbreviated regulatory pathway establishes legal authority for the FDA to review and approve biosimilar biologics, including the possible designation of a biosimilar as "interchangeable" based on its similarity to an existing brand product. Under the BPCIA, an application for a biosimilar product may not be submitted until four years following the date that the reference product was first licensed by the FDA. In addition, the approval of a biosimilar product may not be made effective by the FDA until 12 years after the reference product was first licensed by the FDA. During this 12-year period of exclusivity, another company may still market a competing version of the reference product if the FDA approves a full BLA for the competing product containing the sponsor's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate the safety, purity and potency of their product. The law is complex and is still being interpreted and implemented by the FDA. As a result, its ultimate impact, implementation, and meaning are subject to uncertainty. While it is uncertain when such processes intended to implement BPCIA may be fully adopted by the FDA, any such processes could have a material adverse effect on the future commercial prospects for biological product candidates.

We believe that any of our product candidates that are approved as biological products under a BLA should qualify for the 12-year period of exclusivity. However, there is a risk that this exclusivity could be shortened due to congressional action or otherwise, or that the FDA will not consider such product candidates to be reference products for competing products, potentially creating the opportunity for generic competition sooner than anticipated. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. Moreover, the extent to which a biosimilar product, once approved, will be substituted for any one of our or our collaborators' reference products in a way that is similar to traditional generic substitution for non-biologic products is not yet clear, and will depend on a number of marketplace and regulatory factors that are still developing. If competitors are able to obtain marketing approval for biosimilars referencing any products that we develop alone or with collaborators that may be approved, such products may become subject to competition from such biosimilars, with the attendant competitive pressure and potential adverse consequences.

Additional risks related to the identification, development and commercialization of our food and agricultural product candidates

The regulatory landscape that may govern any potential food or agricultural products that we or our collaborators may develop is uncertain and may adversely impact the development and commercialization activities of our food and agriculture platform.

In the United States, the United States Department of Agriculture, or the USDA, regulates, among other things, the introduction (including the importation, interstate movement or release into the environment) of organisms and products altered or produced through genetic engineering determined to be plant pests or for which there is reason to believe are plant pests. Such organisms and products are considered "regulated articles." However, a petitioner may submit a request for a determination by the USDA of "nonregulated status" for a particular article. A petition for determination of nonregulated status must include detailed information, including relevant experimental data and publications, field trial reports and a description of the genotypic differences between the regulated article and the nonmodified recipient organism, among other things. Neither we nor, to our knowledge, our collaborators have obtained a determination from the USDA that any product candidates are not "regulated articles" under these regulations. We cannot predict whether the USDA, advocacy groups or other third parties will contend that these products are regulated articles. The USDA's regulations also require that companies obtain a permit or file a notification before engaging in the introduction (including the importation, interstate movement or release into the environment such as in field trials) of "regulated articles."

Additionally, a change in the way the USDA interprets its regulations, or a change in its regulations, could subject our or our collaborators' products to more burdensome regulations, thereby substantially increasing the time and costs associated with developing product candidates. Complying with the USDA's Part 340 regulations, including permitting requirements, is a costly, time-consuming process and could delay or prevent the commercialization of any potential food or agricultural products we or our collaborators may develop.

Any potential food or agricultural products that we or our collaborators develop may also be subject to extensive FDA food product regulations. Under sections 201(s) and 409 of the Federal Food, Drug, and Cosmetic Act, or the FDCA, any substance that becomes or is reasonably expected to become a component of food is a food additive and is therefore subject to FDA premarket review and approval, unless the substance is generally recognized, among qualified experts, as having been adequately shown to be safe under the conditions of its intended use (generally recognized as safe, or GRAS), or unless the use of the substance is otherwise excluded from the definition of a food additive, and any food that contains an unsafe food additive is considered adulterated under section 402(a)(2)(C) of the FDCA. The FDA may classify some or all of the potential food or agricultural products that we or our collaborators may develop as containing a food additive that is not GRAS or otherwise determine that such products contain significant compositional differences from existing plant products that require further review. Such classification would cause these potential products to require pre-market approval, which could delay the commercialization of these products. In addition, the FDA is currently evaluating its approach to the regulation of gene-edited plants. For example, on January 19, 2017, the FDA issued a notice in the Federal Register requesting public comment on the use of genome editing techniques to produce new plant varieties that are used for human or animal food or foods that are derived from such new plant varieties produced using genome editing. Among other things, the notice asked for data and information in response to questions about the safety of foods from gene-edited plants, such as whether categories of gene-edited plants present food safety risks different from other plants produced through traditional plant breeding. If the FDA enacts new regulations or policies with respect to gene-edited plants, such policies could result in additional compliance costs and delay or even prevent the commercialization of any of our product candidates, which could negatively affect our profitability. Any delay in the regulatory consultation process, or a determination that any potential products we or our collaborators may develop do not meet regulatory requirements by the FDA or other regulators, could cause a delay in, or prevent, the commercialization of our products, which may lead to reduced acceptance by the public and an increase in competitor products that may directly compete with ours, or could otherwise negatively impact our business, prospects and results of operations.

On May 4, 2018, the USDA issued a proposed rule implementing the National Bioengineered Food Disclosure Standard, with a proposed compliance date of January 1, 2020. Under this proposed rule, the label of a bioengineered, or BE, food must include a disclosure that the food is a BE food or contains a BE ingredient, with certain exceptions. This proposed rule defines BE food as "a food that contains genetic material that was has been modified through in vitro recombinant deoxyribonucleic acid, or DNA, techniques and for which the modification could not otherwise be obtained through conventional breeding or found in nature," except in the case of an incidental additive present in food at an insignificant level and that does not have any technical or functional effect in the food. If this proposed rule is passed and products developed by our collaborators based on our ARCUS technology are required to be labeled "BE," consumer perception of these products may be adversely affect.

In the EU, genetically modified foods, or GM foods, can only be authorized for sale on the market once they have been subject to rigorous safety assessments. The procedures for evaluation and authorization of GM foods are governed by Regulation (EC) 1829/2003 on GM food and feed and Directive 2001/18/EC on the release of genetically modified organisms, or GMOs, into the environment. If the GMO is not to be used in food or feed, then an application must be made under Directive 2001/18/EC. If the GMO is to be used in food or feed (but it is

not grown in the EU) then a single application for both food and feed purposes under Regulation 1829/2003 should be made. If the GMO is used in feed or food and it is also grown in the EU, an application for both cultivation and food/feed purposes needs to be carried out under Regulation (EC) 1829/2003. A different EU regulation, Regulation (EC) 1830/2003, regulates the labeling of products that contain GMOs that are placed on the EU market. Directive 2001/18/EC was amended by Directive (EU) 2015/412 which gives EU Member States more flexibility to allow, restrict or prohibit growing GMOs in their territory, on a range of environmental grounds, even if such crops were previously authorized at EU level. Under Directive 2015/412, EU Member State restrictions or prohibitions can only cover cultivation, and not the free circulation and import of genetically modified seeds and plant propagation material, and should be in conformity with the internal market rules of the EU Treaties. In March 2018, the Commission adopted Commission Directive (EU) 2018/350 amending Directive 2001/18/EC as regards the environmental risk assessment of GMOs. This measure aims to bring the assessment of the environmental risk of GM foods in the EU up to date with developments in scientific knowledge and technical progress. Member States have to transpose the Directive by September 29, 2019. Further EU level legislation on GM foods includes Directive 2009/41/EC on contained use of genetically modified micro-organisms and Regulation (EC) 1946/2003 on transboundary movements of GMOs.

We cannot predict whether or when any governmental authority will change its regulations with respect to any potential food or agricultural products that we develop alone or with collaborators. Advocacy groups have engaged in publicity campaigns and filed lawsuits in various countries against companies and regulatory authorities seeking to halt biotechnology approval activities or influence public opinion against genetically engineered products. In addition, governmental reaction to negative publicity concerning genetically edited agricultural products could result in greater regulation of genetic research and derivative products or regulatory costs that render our or our collaborators' development of potential food or agricultural products cost prohibitive. Our collaborators may use or integrate our products or technology into other products in ways that could subject those collaborators or products to additional regulation.

The overall agricultural industry is susceptible to agricultural price changes, and we may be exposed to risks from changes in commodity prices.

Changes in the prices of agricultural products could result in changes in demand for and prices of food and agricultural products that we or our collaborators may develop. We may be susceptible to these changes as a result of factors beyond our control, such as general economic conditions, seasonal fluctuations, weather conditions, demand, food safety concerns, product recalls and government regulations, subsidies or market export tariffs. If demand for agricultural products that we or our collaborators may develop is negatively impacted, our potential revenues under collaboration agreements for such products may decline, which could adversely affect our results of operations.

The successful commercialization of any food or agricultural products we develop will depend in part on our collaborators' ability to produce high-quality plants and seeds cost-effectively on a large scale and to accurately forecast demand for such potential products, and they may be unable to do so.

The production of commercial-scale quantities of food or agricultural products or seeds for them requires the multiplication of the plants or seeds through a succession of plantings and seed harvests. The cost-effective production of high-quality, high-volume quantities of such products or seeds may depend in part on our collaborators' abilities to scale production processes to produce plants and seeds in sufficient quantity to meet demand. Our collaborators' existing or future plant and seed production techniques may not enable timely meeting of large-scale production goals cost-effectively for any potential food or agricultural products that we and our collaborators may develop.

In addition, because of the length of time it takes to produce commercial quantities of marketable plants and seeds, our collaborators will need to make seed production decisions well in advance of food product sales. The

ability to accurately forecast demand can be adversely affected by a number of factors outside of their control, including changes in market conditions, environmental factors, such as pests and diseases, and adverse weather conditions.

The commercial success of any consumer-centric food or agricultural products that we or our collaborators may develop is reliant on the needs of food manufacturers and the recognition of shifting consumer preferences.

The commercial success of any consumer-centric products depends in part on the ability of the food manufacturer to accurately determine the shifting needs and desires of the ultimate consumer. We will not control the marketing, distribution labeling or any other aspects of the sale and commercialization of the manufacturers' food products. Consumer preferences may be a significant driver in the success of food manufacturers in their efforts to sell food and agricultural products, including products that we or our collaborators may develop. While current trends indicate that consumer preferences may be moving towards "healthier" options, we cannot predict whether such trends will continue or which types of food products will be demanded by consumers in the future. Additionally, as health and nutritional science continues to progress, consumer perception of what foods, nutrients and ingredients are considered "healthy" may shift. We and our collaborators may not be dynamic enough in responding to consumer trends and creating products that will be demanded by consumers in the future. In addition, if consumer demand is lower than our estimates or those of our collaborators, our ability to realize revenues from potential food or agricultural products may be limited. Failure by our collaborators to successfully recognize consumer trends could lower demand for potential food or agricultural products that we or our collaborators may develop, which could harm our business, results of operations and financial condition.

Some of the potential food products we develop alone or with collaborators may be distributed into markets or countries in which they have not received regulatory approval, which may result regulatory challenges or lawsuits.

The scale of the agricultural industry may make it difficult to monitor and control the distribution of any potential food products that we develop alone or with collaborators. As a result, such products may be sold inadvertently within jurisdictions where they are not approved for distribution. Such sales may lead to regulatory challenges or lawsuits against us, which could result in significant expenses and divert our management's attention, which could harm our business, results of operations and financial condition.

Risks related to our reliance on third parties

We have entered into significant arrangements with collaborators and expect to depend on collaborations with third parties for certain research, development and commercialization activities, and if any such collaborations are not successful, it may harm our business and prospects.

We have sought in the past, and anticipate that we will continue to seek in the future, third-party collaborators for the research, development and commercialization of certain product candidates and the research and development of certain technologies. For example, we are party to the Servier Agreement, pursuant to which we are focused on research and development of allogeneic chimeric antigen receptor T cell therapies for up to six oncology targets that utilize or incorporate our genome editing technologies, and we are also party to a collaboration with Gilead focused on research and development of therapeutic product candidates for the treatment of Hepatitis B using ARCUS nucleases. In addition, our food and agriculture platform is based on a consumer-centric model, whereby our research and development activities and potential revenues are based on the needs and commercial success of our collaborators. For example, we are a party to a commercial license agreement with Cargill focused on targeting and modifying certain genes related to saturated oil production in

canola plants. Our likely collaborators for other product research and development arrangements include large and mid-size pharmaceutical and biotechnology companies biotechnology and food, beverage, nutrition and agricultural biotechnology companies, and our likely collaborators for other technology research and development arrangements include universities and other research institutions.

Working with collaborators poses several significant risks. We will likely have limited control over the amount and timing of resources that our collaborators dedicate to the product candidates or technologies we may seek to develop with them. A variety of factors may impact resource allocation decisions of collaborators, such as study or trial results, changes in the collaborator's strategic focus, turnover in personnel responsible for the development activities, financial capacity or external factors such as a business combination or change in control that diverts resources or creates competing priorities. Collaboration agreements may not lead to development or commercialization of product candidates or the development of technologies in the most efficient manner or at all. Resource allocation and other developmental decisions made by our collaborators may result in the delay or termination of research programs, studies or trials, repetition of or initiation of new studies or trials or provision of insufficient funding or resources for the completion of studies or trials or the successful marketing and distribution of any product candidates that may receive approval. Collaborators could independently develop, or develop with third parties, product candidates or technologies that compete directly or indirectly with our product candidates or technologies if the collaborators believe that competitive products or technologies are more likely to be successfully developed or can be commercialized under terms that are more economically attractive than ours. Collaborators may not properly obtain, maintain, enforce or defend our intellectual property or proprietary rights or may use our proprietary information in such a way that could jeopardize or invalidate our proprietary information or expose us to potential litigation. Disputes may arise between us and our collaborators that result in the delay or termination of the research, development or commercialization activities or that result in costly litigation or arbitration that diverts management attention and resources.

Our ability to generate revenues from these arrangements will depend on our collaborators' abilities to successfully perform the functions assigned to them in these arrangements. If our collaborations do not result in the successful development and commercialization of product candidates or technologies, or if one of our collaborators terminates its agreement with us, we may not receive any future funding or milestone or royalty payments under the collaboration. If we do not receive the funding we expect under these agreements, our development of product candidates or technologies could be delayed, and we may need additional resources to develop such product candidates or technologies. In addition, if one of our collaborators terminates its agreement with us, we may find it more difficult to find a suitable replacement collaborator or attract new collaborators and may need to raise additional capital to pursue further development or commercialization of the applicable product candidates or technologies. These events could delay development programs and negatively impact the perception of our company in business and financial communities. Failure to develop or maintain relationships with any current collaborators could result in the loss of opportunity to work with that collaborator or reputational damage that could impact our relationships with other collaborators in the relatively small industry communities in which we operate. Moreover, all of the risks relating to product development, regulatory approval and commercialization described in this prospectus apply to the activities of our collaborators. If our existing collaboration agreements or any collaborative or strategic relationships we may establish in the future are not effective and successful, it may damage our reputation and business prospects, delay or prevent the development and commercialization of product candidates and inhibit or preclude our ability to realize any revenues.

If we are not able to establish collaborations on commercially reasonable terms, we may have to alter our research, development and commercialization plans.

Our research and product development programs and the potential commercialization of any product candidates we develop alone or with collaborators will require substantial additional cash to fund expenses, and we expect that we will continue to seek collaborative arrangements with others in connection with the development and potential commercialization of current and future product candidates or the development of ancillary technologies. We face significant competition in establishing relationships with appropriate collaborators. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators. Whether we reach a definitive agreement for a collaboration will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and the proposed collaborator's evaluation of a number of factors. Those factors may include, among other things and as applicable for the type of potential product or technology, an assessment of the opportunities and risks of our technology, the design or results of studies or trials, the likelihood of approval, if necessary, by the USDA, the FDA or similar regulatory authorities outside the United States, the potential market for the subject product candidate, the costs and complexities of manufacturing and delivering such product candidate to patients, the potential of competing products and technologies and industry and market conditions generally.

Current or future collaborators may also consider alternative product candidates or technologies for similar indications that may be available to collaborate on and whether such a collaboration could be more attractive than the one with us. Additionally, we may be restricted under existing collaboration agreements from entering into future agreements on certain terms or for certain development activities with potential collaborators. For example, we have granted exclusive rights or options to Servier and Gilead for certain targets, and during the terms of our respective collaboration agreements with them we will be restricted from granting rights to other parties to use our ARCUS technology to pursue potential products that address those targets. Similarly, our collaboration agreements have in the past and may in the future contain non-competition provisions that could limit our ability to enter into strategic collaborations with future collaborators.

Collaborations are complex and time-consuming to negotiate and document. We may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we do enter into additional collaboration agreements, the negotiated terms may force us to relinquish rights that diminish our potential profitability from development and commercialization of the subject product candidates or others. If we are unable to enter into additional collaboration agreements, we may have to curtail the research and development of the product candidate or technology for which we are seeking to collaborate, reduce or delay research and development programs, delay potential commercialization timelines, reduce the scope of any sales or marketing activities or undertake research, development or commercialization activities at our own expense. If we elect to increase our expenditures to fund research, development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all.

We expect to rely on third parties to conduct, supervise and monitor our clinical trials and some aspects of our research and preclinical testing, and if those third parties do not successfully carry out their contractual duties, comply with regulatory requirements, or otherwise perform in a satisfactory manner, we may not be able to obtain regulatory approval or commercialize product candidates, or such approval or commercialization may be delayed, and our business may be substantially harmed.

We may rely on medical institutions, clinical investigators, contract laboratories and other third parties, such as CROs, to conduct preclinical studies and future clinical trials for our product candidates. Nevertheless, we will be responsible for ensuring that each of our studies and trials is conducted in accordance with the applicable

protocol, legal and regulatory requirements and scientific standards, and our reliance on such third parties will not relieve us of our regulatory responsibilities.

Although we intend to design the trials for our product candidates either alone or with collaborators, third parties may conduct all of the trials. As a result, many important aspects of our research and development programs, including their conduct and timing, will be outside of our direct control. Our reliance on third parties to conduct future studies and trials will also result in less direct control over the management of data developed through studies and trials than would be the case if we were relying entirely upon our own staff. Communicating with outside parties can also be challenging, potentially leading to mistakes and difficulties in coordinating activities. Outside parties may have staffing difficulties, fail to comply with contractual obligations, experience regulatory compliance issues, undergo changes in priorities, become financially distressed or form relationships with other entities, some of which may be our competitors. We also face the risk of potential unauthorized disclosure or misappropriation of our intellectual property by CROs or other third parties, which may reduce our trade secret protection and allow our potential competitors to access and exploit our proprietary technology. For any violations of laws and regulations during the conduct of our preclinical studies and future clinical trials, we could be subject to warning letters or enforcement action that may include civil penalties up to and including criminal prosecution.

For example, we will remain responsible for ensuring that each of our clinical trials is conducted in accordance with the general investigational plan and protocols for the trial. Moreover, the FDA requires us to comply with regulations, commonly referred to as Good Clinical Practices, or GCPs, for conducting, monitoring, recording and reporting the results of clinical trials to assure that data and reported results are credible and accurate and that the rights, integrity and confidentiality of trial participants are protected. If we, our collaborators, our CROs or other third parties fail to comply with applicable GCPs, the clinical data generated in our clinical trials may be deemed unreliable and FDA or comparable foreign regulatory authorities may require us to perform additional clinical trials before approving our marketing applications. We also are required to register certain ongoing clinical trials and post the results of such completed clinical trials on a government-sponsored database, ClinicalTrials.gov, within certain timeframes. Failure to do so can result in fines, adverse publicity and civil and criminal sanctions.

If our CROs or other third parties do not successfully carry out their contractual duties or obligations, fail to meet expected deadlines, or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements or for any other reasons, trials for product candidates may be extended, delayed or terminated, and we or our collaborators may not be able to obtain regulatory approval for, or successfully commercialize, any product candidate that we develop. If we are required to repeat, extend the duration of or increase the size of any trials we conduct, it could significantly delay commercialization and require significantly greater expenditures. As a result of any of these factors, our financial results and the commercial prospects for any product candidate that we or our collaborators may develop would be harmed, our costs could increase and our ability to generate revenues could be delayed.

We expect to rely on third parties to supply raw materials or manufacture product supplies that are necessary for the conduct of preclinical studies, clinical trials and manufacturing of our product candidates, and failure by third parties to provide us with sufficient quantities of products, or to do so at acceptable quality levels or prices and on a timely basis, could harm our business.

We are dependent on third parties for the supply of various biological materials, such as cells, cytokines and antibodies, and the manufacture of product supplies, such as media, plasmids, mRNA and AAV viral vectors, that are necessary to produce our product candidates. The supply of these materials could be reduced or interrupted at any time. In such case, identifying and engaging an alternative supplier or manufacturer could result in delay, and we may not be able to find other acceptable suppliers or manufacturers on acceptable terms, or at all. Switching suppliers or manufacturers may involve substantial costs and is likely to result in a

delay in our desired clinical and commercial timelines. If we change suppliers or manufacturers for commercial production, applicable regulatory agencies may require us to conduct additional studies or trials. If key suppliers or manufacturers are lost, or if the supply of the materials is diminished or discontinued, we or our collaborators may not be able to develop, manufacture and market product candidates in a timely and competitive manner, or at all. If any of our product candidates receives approval, we will likely need to seek alternative sources of supply of raw materials or manufactured product supplies and there can be no assurance that we will be able to establish such relationships to provide such supplies on commercially reasonable terms or at acceptable quality levels, if at all. If we are unable to identify and procure additional sources of supply that fit our required needs, we could face substantial delays or incur additional costs in procuring such materials. In addition, manufactured product supplies are subject to stringent manufacturing processes and rigorous testing. Delays in the completion and validation of facilities and manufacturing processes of these materials could adversely affect the ability to complete studies or trials and commercialize any product candidates that may receive approval. Furthermore, if our suppliers or manufacturers encounter challenges relating to employee turnover, the supply and manufacturing of our materials could be delayed or adversely affected as such parties seek to hire and train new employees. These factors could cause the delay of studies or trials, regulatory submissions, required approvals or commercialization of product candidates that we or our collaborators may develop, cause us to incur higher costs and prevent us from commercializing products successfully. Furthermore, if our suppliers or manufacturers fail to meet contractual requirements, and we are unable to secure one or more replacements capable of production at a substantially equivalent cost, our or our collaborators' studies or trials may be delayed and we could lose potential revenue.

We may rely on third parties for at least a portion of the manufacturing process of product candidates, and failure by those parties to adequately perform their obligations could harm our business.

We do not currently own any facility that may be used as our clinical-scale manufacturing and processing facility and expect that we may rely on outside vendors for at least a portion of the manufacturing process of product candidates that we or our collaborators may develop. The facilities used by our contract manufacturers to manufacture product candidates must be approved by the FDA or other foreign regulatory agencies pursuant to inspections that will be conducted after we submit an application to the FDA or other foreign regulatory agencies. To the extent that we or our collaborators engage third parties for manufacturing services, we will not control the manufacturing process of, and will be completely dependent on, our contract manufacturing providers for compliance with cGMP requirements for manufacture of the product candidates. We have not yet caused any product candidates to be manufactured or processed on a commercial scale and may not be able to do so. We will make changes as we work to optimize the manufacturing process, and we cannot be sure that even minor changes in the process will result in products that are safe and effective. If our contract manufacturers cannot successfully manufacture material that conforms to our specifications and the strict regulatory requirements of the FDA or other regulatory authorities, they will not be able to secure and/or maintain regulatory approval for their manufacturing facilities. In addition, we have no control over the ability of our contract manufacturers to maintain adequate quality control, quality assurance and qualified personnel. If the FDA or a comparable foreign regulatory authority does not approve these facilities for the manufacture of product candidates or if it withdraws any such approval in the future, we may need to find alternative manufacturing facilities, which would significantly impact our ability to develop, obtain regulatory approval for or market any of our or our collaborators' potential products.

Risks related to intellectual property

Our ability to compete may decline if we do not adequately protect our proprietary rights, and our proprietary rights do not necessarily address all potential threats to our competitive advantage.

Our commercial success depends upon obtaining and maintaining proprietary rights to our intellectual property estate, including rights relating to ARCUS and to our product candidates, as well as successfully defending these rights against third-party challenges and successfully enforcing these rights to prevent third-party infringement. We will only be able to protect ARCUS and product candidates from unauthorized use by third parties to the extent that valid and enforceable patents or effectively protected trade secrets cover them. Our ability to obtain and maintain patent protection for ARCUS and our product candidates is uncertain due to a number of factors, including that:

- we may not have been the first to invent the technology covered by our pending patent applications or issued patents;
- we may not be the first to file patent applications covering product candidates, including their compositions or methods of use, as patent applications in the United States and most other countries are confidential for a period of time after filing;
- our compositions and methods may not be patentable;
- our disclosures in patent applications may not be sufficient to meet the statutory requirements for patentability;
- any or all of our pending patent applications may not result in issued patents;
- others may independently develop identical, similar or alternative technologies, products or compositions or methods of use thereof;
- others may design around our patent claims to produce competitive technologies or products that fall outside of the scope of our patents;
- we may fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection;
- we may not seek or obtain patent protection in countries that may eventually provide us a significant business opportunity;
- any patents issued to us may not provide a basis for commercially viable products, may not provide any competitive advantages or may be successfully challenged by third parties; and
- others may identify prior art or other bases upon which to challenge and ultimately invalidate our patents or otherwise render them unenforceable.

Even if we have or obtain patents covering ARCUS or any product candidates or compositions, we and our collaborators may still be barred from making, using and selling such product candidates or technologies because of the patent rights of others. Others may have filed, and in the future may file, patent applications covering compositions, products or methods that are similar or identical to ours, which could materially affect our ability to successfully develop any product candidates or to successfully commercialize any approved products alone or with collaborators. In addition, because patent applications can take many years to issue, there may be currently pending applications unknown to us that may later result in issued patents that we or our collaborators may infringe. These patent applications may have priority over patent applications filed by us.

The issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, and our owned and licensed patents may be challenged in the courts or patent offices in the United States and abroad. Such challenges may result in loss of exclusivity or freedom to operate or in patent claims being narrowed, invalidated or held unenforceable, in whole or in part, which could limit our ability to stop others from using or commercializing similar or identical technology and products, or limit the duration of the patent protection of our technology and products. Furthermore, we cannot guarantee that any patents will be issued from any pending or future owned or licensed patent applications. Thus, even if our patent applications issue as patents, they may not issue in a form that will provide us with meaningful protection, prevent competitors from competing with us or otherwise provide us with any competitive advantage. In addition, third parties may be able to develop products that are similar to, or better than, ours in a way that is not covered by the claims of our patents, or may have blocking patents that could prevent us from marketing our products or practicing our own patented technology. Moreover, patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after it is filed. Various extensions may be available; however the life of a patent, and the protection it affords, is limited. Without patent protection for current or future product candidates, we may be open to competition from generic versions of such potential products. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to those we or our collaborators may develop.

Obtaining and maintaining a patent portfolio entails significant expense, including periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and patent applications. These expenditures can be at numerous stages of prosecuting patent applications and over the lifetime of maintaining and enforcing issued patents. We may or may not choose to pursue or maintain protection for particular intellectual property in our portfolio. If we choose to forgo patent protection or to allow a patent application or patent to lapse purposefully or inadvertently, our competitive position could suffer. Furthermore, we employ reputable law firms and other professionals to help us comply with the various procedural, documentary, fee payment and other similar provisions we are subject to and, in many cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. There are situations, however, in which failure to make certain payments or noncompliance with certain requirements in the patent process can result in abandonment or lapse of a patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, our competitors might be able to enter the market, which would have a material adverse effect on our business.

Legal action that may be required to enforce our patent rights can be expensive and may involve the diversion of significant management time. There can be no assurance that we will have sufficient financial or other resources to file and pursue infringement claims, which typically last for years before they are concluded. In addition, these legal actions could be unsuccessful and result in the invalidation of our patents, a finding that they are unenforceable or a requirement that we enter into a licensing agreement with or pay monies to a third party for use of technology covered by our patents. We may or may not choose to pursue litigation or other actions against those that have infringed on our patents, or have used them without authorization, due to the associated expense and time commitment of monitoring these activities. If we fail to successfully protect or enforce our intellectual property rights, our competitive position could suffer, which could harm our results of operations.

If we fail to comply with our obligations in the agreements under which we license intellectual property rights from third parties or otherwise experience disruptions to our business relationships with our licensors, we could lose license rights that are important to our business.

We are a party to a number of intellectual property license agreements that are important to our business and expect to enter into additional license agreements in the future. Our existing license agreements impose, and we expect that future license agreements will impose, various diligence, milestone payment, royalty and other

obligations on us. We may need to outsource and rely on third parties for many aspects of the development, sales and marketing of any products covered under our current and future license agreements. Delay or failure by these third parties could adversely affect the continuation of our license agreements with our licensors. If we fail to comply with any of our obligations under these agreements, or we are subject to a bankruptcy, our licensors may have the right to terminate the license, in which event we would not be able to market any products covered by the license.

In addition, disputes may arise regarding the payment of the royalties due to licensors in connection with our exploitation of the rights we license from them. Licensors may contest the basis of royalties we retained and claim that we are obligated to make payments under a broader basis. In addition to the costs of any litigation we may face as a result, any legal action against us could increase our payment obligations under the respective agreement and require us to pay interest and potentially damages to such licensors.

In some cases, patent prosecution of our licensed technology is controlled solely by the licensor. If such licensor fails to obtain and maintain patent or other protection for the proprietary intellectual property we license from such licensor, we could lose our rights to such intellectual property or the exclusivity of such rights, and our competitors could market competing products using such intellectual property. In that event, we may be required to expend significant time and resources to develop or license replacement technology. If we are unable to do so, we or our collaborators may be unable to develop or commercialize the affected product candidates, which could harm our business significantly. In other cases, we control the prosecution of patents resulting from licensed technology. In the event we breach any of our obligations related to such prosecution, we may incur significant liability to our licensing partners.

For example, our license agreement with Duke University, or Duke, which we refer to as the Duke License, imposes various payment, royalty and other obligations on us in order to maintain the license. For example, if we fail to make royalty payments or milestone payments required under the Duke License, Duke may terminate the agreement. If we or our affiliates obtain a license from a third party to practice the Duke technology, we must use commercially reasonable efforts to secure a covenant not to sue Duke, or any of its faculty, students, employees or agents, for any research and development efforts conducted at Duke that resulted in the creation of any of its inventions or intellectual property rights arising therefrom. Additionally, because development of the Duke technology was funded in part by the U.S. government, it is subject to certain government rights and obligations, including the requirement that any products sold in the United States based upon such technology be substantially manufactured in the United States.

In addition, our cross-license agreement with Cellectis, or the Cellectis License, imposes various obligations on us in order to maintain the license. In particular, if we participate in or provide assistance to a third party challenging the validity, enforceability and/or patentability of any claim of any patent licensed to us by Cellectis under this agreement, Cellectis may terminate the agreement. The Cellectis License does not provide exclusive rights to use the licensed intellectual property and technology or rights in all relevant fields in which we may wish to develop or commercialize our technology and products in the future. As a result, we are not able to prevent competitors from developing and commercializing competitive products and technology that may use this technology. Additionally, we do not have the right to control the preparation, filing, prosecution, maintenance, enforcement and defense of patents and patent applications covering the technology that we license from Cellectis. Therefore, we cannot be certain that these patents and patent applications will be prepared, filed, prosecuted, maintained and defended in a manner consistent with the best interests of our business. If Cellectis or other licensors fail to prosecute, maintain, enforce and defend the patents subject to such licenses, or lose rights to those patents or patent applications, the rights we have licensed may be reduced or eliminated, and our right to develop and commercialize any of our products that are the subject of such licensed rights could be adversely affected.

If we fail to comply with our obligations under the Duke License or the Cellectis License, or arrangements with any other licensors, our counterparties may have the right to terminate these agreements, in which event we might not be able to develop, manufacture or market any product candidate that is covered by these agreements, which could materially adversely affect the value of any such product candidate. Termination of these agreements or reduction or elimination of our rights under these agreements may result in our having to negotiate new or reinstated agreements with less favorable terms, or cause us to lose our rights under these agreements, including our rights to important intellectual property or technology.

Disputes may arise regarding intellectual property subject to a license agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- the amounts of royalties, milestones or other payments due to our licensors;
- the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the license agreement;
- the sublicensing of patent and other rights under our collaborative development relationships;
- our diligence obligations under the license agreement and what activities satisfy those diligence obligations;
- the ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us and our collaborators; and
- the priority of invention of patented technology.

Such disputes may be costly to resolve and may divert management's attention away from day-to-day activities. If disputes over intellectual property that we have licensed from third parties prevent or impair our ability to maintain our licensing arrangements on acceptable terms, we or our collaborators may be unable to successfully develop and commercialize the affected product candidates.

Some of our in-licensed intellectual property has been discovered through government funded programs and thus may be subject to federal regulations such as "march-in" rights, certain reporting requirements and a preference for U.S.-based companies, and compliance with such regulations may limit our exclusive rights and our ability to contract with non-U.S. manufacturers.

Certain intellectual property rights that have been in-licensed pursuant to the Duke License have been generated through the use of U.S. government funding and are therefore subject to certain federal regulations. As a result, the U.S. government may have certain rights to intellectual property embodied in our current or future product candidates pursuant to the Bayh-Dole Act of 1980, or the Bayh-Dole Act. These U.S. government rights include a non-exclusive, non-transferable, irrevocable worldwide license to use inventions for any governmental purpose. In addition, the U.S. government has the right, under certain limited circumstances, to require the licensor to grant exclusive, partially exclusive or non-exclusive licenses to any of these inventions to a third party if it determines that (1) adequate steps have not been taken to commercialize the invention, (2) government action is necessary to meet public health or safety needs or (3) government action is necessary to meet requirements for public use under federal regulations (also referred to as "march-in rights"). The U.S. government also has the right to take title to these inventions if the licensor fails to disclose the invention to the government or fails to file an application to register the intellectual property within specified time limits. Intellectual property generated under a government funded program is also subject to certain reporting requirements, compliance with which may require us to expend substantial resources. In addition, the U.S. government requires that any products embodying any of these inventions or produced through the use of any of these inventions be manufactured substantially in the United States, and the Duke License requires that we

comply with this requirement. This preference for U.S. industry may be waived by the federal agency that provided the funding if the owner or assignee of the intellectual property can show that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture the products substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible. This preference for U.S. industry may limit our ability to contract with non-U.S. product manufacturers for products covered by such intellectual property. To the extent any of our owned or licensed future intellectual property is also generated through the use of U.S. government funding, the provisions of the Bayh-Dole Act may similarly apply.

If we do not obtain patent term extension in the United States under the Hatch-Waxman Act and in foreign countries under similar legislation with respect to our product candidates, thereby potentially extending the term of marketing exclusivity for such product candidates, our business may be harmed.

In the United States, a patent that covers an FDA-approved drug or biologic may be eligible for a term extension designed to restore the period of the patent term that is lost during the premarket regulatory review process conducted by the FDA. Depending upon the timing, duration and conditions of FDA marketing approval of our product candidates, one or more of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, or the Hatch-Waxman Act, which permits a patent term extension of up to five years for a patent covering an approved product as compensation for effective patent term lost during product development and the FDA regulatory review process. In the European Union, our product candidates may be eligible for term extensions based on similar legislation. In either jurisdiction, however, we may not receive an extension if we fail to apply within applicable deadlines, fail to apply prior to expiration of relevant patents or otherwise fail to satisfy applicable requirements. Even if we are granted such extension, the duration of such extension may be less than our request. If we are unable to obtain a patent term extension, or if the term of any such extension is less than our request, the period during which we can enforce our patent rights for that product will be in effect shortened and our competitors may obtain approval to market competing products sooner. The resulting reduction of years of revenue from applicable products could be substantial.

Patents and patent applications involve highly complex legal and factual questions, which, if determined adversely to us, could negatively impact our patent position.

The patent positions of biopharmaceutical and biotechnology companies and other actors in our fields of business can be highly uncertain and typically involve complex scientific, legal and factual analyses. In particular, the interpretation and breadth of claims allowed in some patents covering biopharmaceutical compositions may be uncertain and difficult to determine, and are often affected materially by the facts and circumstances that pertain to the patented compositions and the related patent claims. The standards of the United States Patent and Trademark Office, or the USPTO, and its foreign counterparts are sometimes uncertain and could change in the future. Consequently, the issuance and scope of patents cannot be predicted with certainty. Patents, if issued, may be challenged, invalidated or circumvented. U.S. patents and patent applications may also be subject to interference or derivation proceedings, and U.S. patents may be subject to reexamination proceedings, post-grant review and/or *inter partes* review in the USPTO. International patents may also be subject to opposition or comparable proceedings in the corresponding international patent office, which could result in either loss of the patent or denial of the patent application or loss or reduction in the scope of one or more of the claims of the patent or patent application. In addition, such interference, derivation, reexamination, post-grant review, *inter partes* review and opposition proceedings may be costly. Accordingly, rights under any issued patents may not provide us with sufficient protection against competitive products or processes.

Furthermore, even if not challenged, our patents and patent applications may not adequately protect our technology and any product candidates or products that we develop alone or with collaborators or prevent others from designing their products to avoid being covered by our claims. If the breadth or strength of protection provided by the patent applications we hold with respect to product candidates or potential products is threatened, it could dissuade companies from collaborating with us to develop, and could threaten our or their ability to successfully commercialize, such product candidates. Furthermore, for U.S. applications in which all claims are entitled to a priority date before March 16, 2013, an interference proceeding can be provoked by a third party or instituted by the USPTO in order to determine who was the first to invent any of the subject matter covered by such patent claims.

In addition, changes in, or different interpretations of, patent laws in the United States and other countries may permit others to use our discoveries or to develop and commercialize our technology and product candidates or products without providing any compensation to us, or may limit the scope of patent protection that we are able to obtain. The laws of some countries do not protect intellectual property rights to the same extent as U.S. laws, and those countries may lack adequate rules and procedures for defending our intellectual property rights.

If the patent applications we hold or have in-licensed with respect to our current and future research and development programs and product candidates fail to issue, if their validity, breadth or strength of protection is threatened, or if they fail to provide meaningful exclusivity for our technology or any products and product candidates that we or our collaborators may develop, it could dissuade companies from collaborating with us to develop product candidates, encourage competitors to develop competing products or technologies and threaten our or our collaborators' ability to commercialize future product candidates. Any such outcome could have a material adverse effect on our business.

Third parties may assert claims against us alleging infringement of their patents and proprietary rights, or we may need to become involved in lawsuits to defend or enforce our patents, either of which could result in substantial costs or loss of productivity, delay or prevent the development and commercialization of product candidates, prohibit our use of proprietary technology or sale of potential products or put our patents and other proprietary rights at risk.

Our commercial success depends in part upon our ability to develop, manufacture, market and sell product candidates without alleged or actual infringement, misappropriation or other violation of the patents and proprietary rights of third parties. Litigation relating to infringement or misappropriation of patent and other intellectual property rights in the pharmaceutical, biotechnology and agricultural biotechnology industries is common, including patent infringement lawsuits, interferences, oppositions and reexamination proceedings before the USPTO and corresponding international patent offices. The various markets in which we plan to operate are subject to frequent and extensive litigation regarding patents and other intellectual property rights. In addition, many companies in intellectual property-dependent industries, including the biotechnology, agricultural biotechnology and pharmaceutical industries, have employed intellectual property litigation as a means to gain an advantage over their competitors. Numerous United States, EU and other internationally issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we and our collaborators are developing product candidates, and as the biotechnology, agricultural biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates may be subject to claims of infringement of the intellectual property rights of third parties. For example, we are aware of certain patents held by third parties relating to the modification of T cells, including the production of CAR T cells. Although conducting clinical trials and other development activities with respect to our CAR T product candidates is not considered an act of infringement in the United States, if and when any of our CAR T product candidates may be approved by the FDA, those third parties may seek to enforce their patents by filing a patent infringement lawsuit against us. As a result of any patent infringement claims, or in

order to avoid any potential infringement claims, we may choose to seek, or be required to seek, a license from the third party, which may require payment of substantial royalties or fees, or require us to grant a cross-license under our intellectual property rights, similar to the cross license we granted Cellectis as part of our patent litigation settlement. These licenses may not be available on reasonable terms or at all. Even if a license can be obtained on reasonable terms, the rights may be nonexclusive, which would give our competitors access to the same intellectual property rights. If we are unable to enter into a license on acceptable terms, we or our collaborators could be prevented from commercializing one or more product candidates, or forced to modify such product candidates, or to cease some aspect of our business operations, which could harm our business significantly. We or our collaborators might also be forced to redesign or modify our technology or product candidates so that we no longer infringe the third-party intellectual property rights, which may result in significant cost or delay to us, or which redesign or modification could be impossible or technically infeasible. Even if we were ultimately to prevail, any of these events could require us to divert substantial financial and management resources that we would otherwise be able to devote to our business.

Further, if a patent infringement suit is brought against us, our collaborators or our third-party service providers, our development, manufacturing or sales activities relating to the product or product candidate that is the subject of the suit may be delayed or terminated. In addition, defending such claims has in the past and may in the future cause us to incur substantial expenses and, if successful, could cause us to pay substantial damages if we are found to be infringing a third party's patent rights. These damages potentially include increased damages and attorneys' fees if we are found to have infringed such rights willfully. Some claimants may have substantially greater resources than we do and may be able to sustain the costs of complex intellectual property litigation to a greater degree and for longer periods of time than we could. In addition, patent holding companies that focus solely on extracting royalties and settlements by enforcing patent rights may target us. In addition, if the breadth or strength of protection provided by the patents and patent applications we own or in-license is threatened, it could dissuade companies from collaborating with us to license, develop or commercialize current or future product candidates.

We have been and may in the future be subject to third-party claims and similar adversarial proceedings or litigation in other jurisdictions regarding our infringement of the patent rights of third parties. Even if such claims are without merit, a court of competent jurisdiction could hold that these third-party patents are valid, enforceable and infringed, and the holders of any such patents may be able to block our or our collaborators' ability to further develop or commercialize the applicable product candidate unless we obtain a license under the applicable patents, or until such patents expire or are finally determined to be invalid or unenforceable. Similarly, if any third-party patents were held by a court of competent jurisdiction to cover aspects of our technologies, compositions, formulations, or methods of treatment, prevention or use, the holders of any such patents may be able to prohibit our use of those technologies, compositions, formulations, methods of treatment, prevention or use or other technologies, effectively blocking our or our collaborators' ability to develop and commercialize the applicable product candidate until such patent expires or is finally determined to be invalid or unenforceable or unless we or our collaborators obtain a license.

Some of our competitors may be able to sustain the costs of complex intellectual property litigation more effectively than we can because they have substantially greater resources. In addition, intellectual property litigation, regardless of its outcome, may cause negative publicity, adversely impact prospective customers, cause product shipment delays or prohibit us from manufacturing, marketing or otherwise commercializing our products, services and technology. Any uncertainties resulting from the initiation and continuation of any litigation could have a material adverse effect on our ability to raise additional funds or otherwise have a material adverse effect on our business, results of operation, financial condition or cash flows.

If we or one of our licensors were to initiate legal proceedings against a third party to enforce a patent covering our technology or a product candidate, the defendant could counterclaim that our patent is invalid or

unenforceable. In patent litigation in the United States and Europe, defendant counterclaims alleging invalidity or unenforceability are common. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, for example, lack of novelty, obviousness or non-enablement. Third parties might allege unenforceability of our patents because during prosecution of the patent an individual connected with such prosecution withheld relevant information, or made a misleading statement. The outcome of proceedings involving assertions of invalidity and unenforceability during patent litigation is unpredictable. With respect to the validity of patents, for example, we cannot be certain that there is no invalidating prior art of which we and the patent examiner were unaware during prosecution, but that an adverse third party may identify and submit in support of such assertions of invalidity. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we would lose at least part, and perhaps all, of the patent protection on our technology or product candidates. Our patents and other intellectual property rights also will not protect our technology if competitors design around our protected technology without infringing our patents or other intellectual property rights. Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims may cause us to incur significant expenses and could distract our technical and management personnel from their normal responsibilities. In addition, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments, and if securities analysts or investors view these announcements in a negative light, the price of our common stock could be adversely affected. Such litigation or proceedings could substantially increase our operating losses and reduce our resources available for development activities. We may not have sufficient financial or other resources to adequately conduct such litigation or proceedings.

Developments in patent law could have a negative impact on our business.

From time to time, the United States Supreme Court, or the Supreme Court, other federal courts, the United States Congress, or Congress, the USPTO and similar international authorities may change the standards of patentability, and any such changes could have a negative impact on our business. For example, the America Invents Act, or the AIA, which was passed in September 2011, resulted in significant changes to the U.S. patent system. An important change introduced by the AIA is that, as of March 16, 2013, the United States transitioned from a “first-to-invent” to a “first-to-file” system for deciding which party should be granted a patent when two or more patent applications are filed by different parties claiming the same invention. Under a “first-to-file” system, assuming the other requirements for patentability are met, the first inventor to file a patent application generally will be entitled to a patent on the invention regardless of whether another inventor had made the invention earlier. A third party that files a patent application in the USPTO after that date but before us could therefore be awarded a patent covering an invention of ours even if we made the invention before it was made by the third party. Circumstances could prevent us from promptly filing patent applications on our inventions.

The AIA limited where a patentee may file a patent infringement suit and provided opportunities for third parties to challenge any issued patent in the USPTO. Those provisions apply to all of our U.S. patents, regardless of when issued. Because of a lower evidentiary standard in USPTO proceedings compared to the evidentiary standard in U.S. federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third party may attempt to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action. These provisions could increase the uncertainties and costs surrounding the prosecution of our or our licensors’ patent applications and the enforcement or defense of our or our licensors’ issued patents.

Additionally, the Supreme Court has ruled on several patent cases in recent years either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations, and there are other open questions under patent law that courts have yet to decisively address. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of our patents and patent applications. Depending on decisions by Congress, the federal courts and the USPTO, the laws and regulations governing patents could change in unpredictable ways and could weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future. In addition, the European patent system is relatively stringent in the type of amendments that are allowed during prosecution, but the complexity and uncertainty of European patent laws has also increased in recent years. Complying with these laws and regulations could limit our ability to obtain new patents in the future that may be important for our business.

If we were unable to protect the confidentiality of our trade secrets and enforce our intellectual property assignment agreements, our business and competitive position would be harmed.

In addition to patent protection, because we operate in the highly technical field of development of product candidates and products using genome editing, we rely significantly on trade secret protection in order to protect our proprietary technology and processes. Trade secrets are difficult to protect. Our policy is to enter into confidentiality and intellectual property assignment agreements with our employees, consultants, outside scientific collaborators, sponsored researchers and other advisors. These agreements generally require that the other party keep confidential and not disclose to third parties all confidential information developed by the party or made known to the party by us during the course of the party's relationship with us. These agreements also generally provide that inventions conceived by the party in the course of rendering services to us will be our exclusive property. However, we may be unsuccessful in executing such an agreement with each party who in fact conceives or develops intellectual property that we regard as our own. Our assignment agreements may not be self-executing or may be breached, and we may be forced to bring claims against third parties, or defend claims they may bring against us, to determine the ownership of what we regard as our intellectual property. In addition, these agreements may be held unenforceable and may not effectively assign intellectual property rights to us. If our trade secrets and other unpatented or unregistered proprietary information are disclosed, we are likely to lose such trade secret protection.

In addition, certain provisions in our intellectual property agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could affect the scope of our rights to the relevant intellectual property or technology, or affect financial or other obligations under the relevant agreement, either of which could have a material adverse effect on our business, financial condition, results of operations and prospects.

In addition, agreements with third parties typically restrict the ability of such third parties to publish data potentially relating to our trade secrets. Our academic collaborators typically have rights to publish data, provided that we are notified in advance and may delay publication for a specified period of time in order to secure our intellectual property rights arising from the arrangement. In other cases, publication rights are controlled exclusively by us, although in some cases we may share these rights with other parties. We also conduct joint research and product development activities that may require us to share trade secrets under the terms of our research and development collaborations or similar agreements. In addition to contractual measures, we try to protect the confidential nature of our proprietary information using physical and technological security measures. Such measures may not provide adequate protection for our proprietary information. For example, our security measures may not prevent an employee or consultant with authorized access from misappropriating our trade secrets and providing them to a competitor, and the recourse we have available against such misconduct may not provide an adequate remedy to protect our interests fully. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret can be difficult, expensive and time

consuming, and the outcome is unpredictable. In addition, courts outside the United States may be less willing to protect trade secrets. Furthermore, our proprietary information may be independently developed by others in a manner that could prevent legal recourse by us. Competitors could purchase any products we may develop and commercialize and attempt to reverse engineer and replicate some or all of the competitive advantages we derive from our development efforts, willfully infringe our intellectual property rights or design around our protected technology. In addition, our key employees, consultants, suppliers or other individuals with access to our proprietary technology and know-how may incorporate that technology and know-how into projects and inventions developed independently or with third parties. As a result, disputes may arise regarding the ownership of the proprietary rights to such technology or know-how, and any such dispute may not be resolved in our favor. If any of our confidential or proprietary information, including our trade secrets, were to be disclosed or misappropriated, or if any such information was independently developed by a competitor, our competitive position could be harmed and such disclosure or misappropriation could have a material adverse effect on our business.

We will not seek to protect our intellectual property rights in all jurisdictions throughout the world, and we may not be able to adequately enforce our intellectual property rights even in the jurisdictions where we seek protection.

Filing, prosecuting and defending patents on product candidates in all countries and jurisdictions throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States could be less extensive than those in the United States, assuming that rights are obtained in the United States. In-licensing patents covering product candidates in all countries throughout the world may similarly be prohibitively expensive, if such opportunities are available at all. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions.

We generally apply for patents in those countries where we intend to make, have made, use, offer for sale or sell products and where we assess the risk of infringement to justify the cost of seeking patent protection. However, we do not seek protection in all countries where we sell products and we may not accurately predict all the countries where patent protection would ultimately be desirable. If we fail to timely file a patent application in any such country or major market, we may be precluded from doing so at a later date. Competitors may use our technologies in jurisdictions where we do not pursue and obtain patent protection to develop their own products and may export otherwise infringing products to territories where we have patent protection, but where our ability to enforce our patent rights is not as strong as in the United States. These products may compete with any products that we or our collaborators may develop, and our patents or other intellectual property rights may not be effective or sufficient to prevent such competition.

The laws of some other countries do not protect intellectual property rights to the same extent as the laws of the United States. For example, European patent law restricts the patentability of methods of treatment of the human body more than U.S. law does. Patent protection must ultimately be sought on a country-by-country basis, which is an expensive and time-consuming process with uncertain outcomes. Accordingly, we may choose not to seek patent protection in certain countries, and we will not have the benefit of patent protection in such countries. In addition, the legal systems of some countries, particularly developing countries, do not favor the enforcement of patents and other intellectual property protection, especially those relating to biopharmaceuticals or biotechnologies. As a result, many companies have encountered significant difficulties in protecting and defending intellectual property rights in certain jurisdictions outside the United States. Such issues may make it difficult for us to stop the infringement of our patents, if obtained, or the misappropriation of our other intellectual property rights. For example, many other countries, including countries in the EU, have

compulsory licensing laws under which a patent owner must grant licenses to third parties. In addition, many countries limit the enforceability of patents against third parties, including government agencies or government contractors. In these countries, patents may provide limited or no benefit. In those countries, we and our licensors may have limited remedies if patents are infringed or if we or our licensors are compelled to grant a license to a third party, which could materially diminish the value of those patents and could limit our potential revenue opportunities. Accordingly, our and our licensors' efforts to enforce intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we own or license.

Furthermore, proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, subject our patents to the risk of being invalidated or interpreted narrowly, subject our patent applications to the risk of not issuing or provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate, and the damages or other remedies awarded to us, if any, may not be commercially meaningful, while the damages and other remedies we may be ordered to pay such third parties may be significant. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

We may not be successful in obtaining or maintaining necessary rights to product components and processes for our development pipeline through acquisitions and in-licenses.

We have rights, through licenses from third parties and under patents that we own, to the intellectual property to develop the product candidates we are currently developing alone or with collaborators. Because our programs may involve additional product candidates that may require the use of proprietary rights held by third parties, the growth of our business may depend in part on our ability to acquire, in-license or use these proprietary rights. In addition, product candidates may require specific formulations to work effectively and efficiently, and these rights may be held by others. We may be unable to acquire or in-license any compositions, methods of use, processes or other third-party intellectual property rights from third parties that we identify. The licensing and acquisition of third-party intellectual property rights is a competitive area, and a number of more established companies, or companies that have greater resources than we do, may also be pursuing strategies to license or acquire third-party intellectual property rights that we may consider necessary or attractive to develop or commercialize product candidates. These established companies may have a competitive advantage over us due to their size and greater cash resources and clinical development and commercialization capabilities. We may not be able to successfully complete such negotiations and ultimately acquire the rights to the intellectual property surrounding product candidates that we may seek to acquire.

For example, we sometimes collaborate with academic institutions to accelerate our preclinical research or development under written agreements with these institutions. Typically, these institutions provide us with an option to negotiate a license to any of the institution's rights in technology resulting from the strategic alliance. Regardless of such right of first negotiation, we may be unable to negotiate a license within the specified time frame or under terms that are acceptable to us, and the institution may license such intellectual property rights to third parties, potentially blocking our ability to pursue our development and commercialization plans.

In addition, companies that perceive us to be a competitor may be unwilling to assign or license to us intellectual property rights that we require in order to successfully develop and commercialize potential products. We also may be unable to obtain such a license or assignment on terms that would allow us to make an appropriate return on our investment. In either event, our business and prospects for growth could suffer.

If our trademarks and trade names are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected.

If our trademarks and trade names are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected. We may not be able to protect our rights to our trademarks and trade names, which we need to build name recognition among potential collaborators or customers in our markets of interest. At times, competitors may adopt trade names or trademarks similar to ours, thereby impeding our ability to build brand identity and possibly leading to market confusion. In addition, there could be potential trade name or trademark infringement claims brought by owners of other registered trademarks or trademarks that incorporate variations of our unregistered trademarks or trade names. Over the long term, if we are unable to successfully register our trademarks and trade names and establish name recognition based on our trademarks and trade names, then we may not be able to compete effectively and our business may be adversely affected. Our efforts to enforce or protect our proprietary rights related to trademarks, trade secrets, domain names, copyrights and other intellectual property may be ineffective and could result in substantial costs and diversion of resources and could adversely impact our financial condition or results of operations.

Risks related to our organization, structure and operations

We will need to expand our organization, and we may experience difficulties in managing this growth, which could disrupt our operations.

As of September 30, 2018, we had 115 employees. We will need to significantly expand our organization, and our future financial performance, ability to develop and commercialize product candidates alone or with collaborators and ability to compete effectively will depend in part on our ability to effectively manage any future growth. We may have difficulty identifying, hiring and integrating new personnel. Many of the biotechnology companies that we compete against for qualified personnel and consultants have greater financial and other resources, different risk profiles and a longer history than we do. If we are unable to continue to attract and retain high-quality personnel and consultants, the rate and success at which we can identify and develop product candidates, enter into collaborative arrangements and otherwise operate our business will be limited.

Future growth would impose significant additional responsibilities on our management, including the need to identify, recruit, maintain, motivate and integrate additional employees, consultants and contractors. Management may need to divert a disproportionate amount of its attention away from our day-to-day activities and devote a substantial amount of time to managing these growth activities. Due to our limited financial resources and the limited experience of our management team in managing a company with such anticipated growth, we may not be able to effectively manage the expected expansion of our operations or recruit and train additional qualified personnel. Moreover, the expected physical expansion of our operations may lead to significant costs and may divert our management and business development resources from other projects, such as the development of product candidates. If we are not able to effectively manage the expansion of our operations, it may result in weaknesses in our infrastructure, increase our expenses more than expected, give rise to operational mistakes, loss of business opportunities, loss of employees and reduced productivity. Our future financial performance, ability to successfully commercialize any of our product candidates and our ability to compete effectively will depend, in part, on our ability to effectively manage any future growth.

We may engage in transactions that could disrupt our business, cause dilution to our stockholders or reduce our financial resources.

In the future, we may enter into transactions to acquire or in-license rights to product candidates, products or technologies or to acquire other businesses. If we do identify suitable candidates, we may not be able to enter

into such transactions on favorable terms, or at all. Any such acquisitions or in-licenses may not strengthen our competitive position, and these transactions may be viewed negatively by customers or investors. We may decide to incur debt in connection with an acquisition or in-license, which may negatively impact our financial condition and restrict our operations, or issue our common stock or other equity securities to the stockholders of the acquired company, which would reduce the percentage ownership of our existing stockholders. We could incur losses resulting from undiscovered liabilities of the acquired business that are not covered by the indemnification we may obtain from the sellers of the acquired business. In addition, we may not be able to successfully integrate the acquired personnel, technologies and operations into our existing business in an effective, timely and nondisruptive manner. Such transactions may also divert management attention from day-to-day responsibilities, increase our expenses and reduce our cash available for operations and other uses. We cannot predict the number, timing or size of future acquisitions or in-licenses or the effect that they might have on our operating results.

Our future success depends on our ability to retain our Chief Executive Officer, Chief Scientific Officer, Chief Technology Officer and other key executives and to attract, retain and motivate qualified personnel.

We are highly dependent on the research and development experience, technical skills, leadership and continued service of certain members of our management and scientific teams, including Matthew Kane, our Chief Executive Officer, Derek Jantz, our Chief Scientific Officer, and Jeff Smith, our Chief Technology Officer. Although we have formal employment agreements with our executive officers, these agreements do not prevent them from terminating their employment with us at any time upon thirty days' written notice. We maintain a $1 million "key man" life insurance policy for our benefit on each of the lives of Drs. Jantz and Smith, but not on the lives of any of our other team members. The loss of the services of any of these persons could impede the achievement of our research, development and commercialization objectives.

Recruiting and retaining qualified scientific, clinical, manufacturing and, if we retain commercialization responsibility for any product candidate we develop alone or with collaborators, sales and marketing personnel will also be critical to our success. We may not be able to attract and retain these personnel on acceptable terms or at all given the competition among numerous pharmaceutical and biotechnology companies for similar personnel. We also experience competition for the hiring of scientific and clinical personnel from universities and research institutions. In addition, we rely on consultants and advisors, including scientific and clinical advisors, to assist us in formulating our research and development and commercialization strategies. Our consultants and advisors may be employed by employers other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us. The inability to recruit, integrate, motivate and retain additional skilled and qualified personnel, or the loss of services of certain executives, key employees, consultants or advisors, may impede the progress of our research, development and commercialization objectives and have a material adverse effect on our business.

We will incur increased costs as a result of operating as a public company, and our management will be required to devote substantial time to new compliance initiatives and corporate governance practices, including establishing and maintaining proper and effective internal control over financial reporting.

As a public company, we will incur significant legal, accounting and other expenses that we did not incur as a private company. We will be subject to the Securities Exchange Act of 1934, as amended, or the Exchange Act, including the reporting requirements thereunder, the Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of The Nasdaq Stock Market LLC, or Nasdaq, and other applicable securities rules and regulations, including requirements related to the establishment and maintenance of effective disclosure and financial controls and corporate governance practices. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs, make

some activities more difficult, time consuming or costly, and increase demand on our systems and resources. When we no longer qualify as an emerging growth company, legal, accounting and other expenses are expected to further increase.

Pursuant to Section 404 of the Sarbanes-Oxley Act of 2002, or Section 404, we will be required to furnish a report by our management on our internal control over financial reporting beginning with our second annual report following the completion of our initial public offering. However, while we remain an emerging growth company, we will not be required to include an attestation report on internal control over financial reporting issued by our independent registered public accounting firm. To achieve compliance with Section 404 of the Sarbanes-Oxley Act within the prescribed period, we will be engaged in a process to document and evaluate our internal control over financial reporting, which is both costly and challenging. We may need to hire more employees in the future or engage outside consultants to comply with these requirements, which will further increase our costs and expenses. If we fail to implement the requirements of Section 404 of the Sarbanes-Oxley Act in the required timeframe, we may be subject to sanctions or investigations by regulatory authorities, including the SEC and Nasdaq. Furthermore, if we are unable to conclude that our internal control over financial reporting is effective, our investors may lose confidence in the accuracy and completeness of our financial reports, the market price of our common stock could decline, and we could be subject to sanctions or investigations by regulatory authorities. Failure to implement or maintain an effective internal control system could also restrict our future access to the capital markets.

Our business and operations would suffer in the event of system failures or security breaches.

Despite the implementation of security measures, our computer systems, as well as those of third parties with which we have relationships, are vulnerable to damage from computer viruses, unauthorized access, natural and manmade disasters, terrorism, war and telecommunication and electrical failures. While we do not believe that we have experienced any such system failure, accident or security breach to date, if such an event were to occur and cause interruptions in our or their operations, it could result in delays and/or material disruptions of our research and development programs. For example, the loss of trial data from completed, ongoing or planned trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. To the extent that any disruption or security breach were to result in a loss of or damage to data or applications, or inappropriate disclosure of personal, confidential or proprietary information, we could incur liability and the development of our product candidates could be delayed.

The U.S. federal and various state and foreign governments have enacted or proposed requirements regarding the collection, distribution, use, security and storage of personally identifiable information and other data relating to individuals, and U.S. federal and state consumer protection laws are being applied to enforce regulations related to the online collection, use and dissemination of data. In the ordinary course of our business, we and third parties with which we have relationships will continue to collect and store sensitive data, including intellectual property, clinical trial data, proprietary business information, personal data and personally identifiable information of our clinical trial subjects and employees, in data centers and on networks. The secure processing, maintenance and transmission of this information is critical to our operations. Despite our and our collaborators' security measures, our information technology and infrastructure may be vulnerable to attacks by hackers or internal bad actors, breaches due to employee error, technical vulnerabilities, malfeasance or other disruptions. A number of proposed and enacted federal, state and international laws and regulations obligate companies to notify individuals of security breaches involving particular personally identifiable information, which could result from breaches experienced by us or by third parties, including collaborators, vendors, contractors or other organizations with which we have formed strategic relationships. Although, to our knowledge, neither we nor any such third parties have experienced any material security breach, and even though we may have contractual protections with such third parties, any such breach could compromise our or their networks and the information stored there could be accessed, publicly disclosed, lost

or stolen. Any such access, disclosure, notifications, follow-up actions related to such a security breach or other loss of information could result in legal claims or proceedings, liability under laws that protect the privacy of personal information and significant costs, including regulatory penalties, fines and legal expenses, and such an event could disrupt our operations, cause us to incur remediation costs, damage our reputation and cause a loss of confidence in us and our or such third parties' ability to conduct clinical trials, which could adversely affect our reputation and delay our research and development programs.

We or third parties with whom we have relationships may be adversely affected by natural or manmade disasters, and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

Natural or manmade disasters could severely disrupt our operations and have a material adverse effect on our business, results of operations, financial condition and prospects. If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our facilities, that damaged our infrastructure or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible for us to continue our business for a substantial period of time, and our research and development activities could be setback or delayed. The disaster recovery and business continuity plans we have in place may prove inadequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which could have a material adverse effect on our business, and such an event could disrupt our operations, cause us to incur remediation costs, damage our reputation and cause a loss of confidence in us and our or third parties' ability to conduct clinical trials, which could adversely affect our reputation and delay our research and development programs.

Our insurance policies are expensive and protect us only from some business risks, which leaves us exposed to significant uninsured liabilities.

We do not carry insurance for all categories of risk that our business may encounter. If we obtain marketing approval for any product candidates that we or our collaborators may develop, we intend to acquire insurance coverage to include the sale of commercial products, but we may be unable to obtain such insurance on commercially reasonable terms or in adequate amounts. We do not carry specific biological or hazardous waste insurance coverage, and our property, casualty and general liability insurance policies specifically exclude coverage for damages and fines arising from biological or hazardous waste exposure or contamination. Accordingly, in the event of contamination or injury, we could be held liable for damages or be penalized with fines in an amount exceeding our resources, and clinical trials or regulatory approvals for any of our product candidates could be suspended. We also expect that operating as a public company will make it more expensive for us to obtain director and officer liability insurance, and we may be required to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. As a result, it may be more difficult for us to attract and retain qualified individuals to serve on our board of directors, our board committees or as our executive officers.

Insurance coverage is becoming increasingly expensive, and in the future we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses. We do not know if we will be able to maintain existing insurance with adequate levels of coverage, and any liability insurance coverage we acquire in the future may not be sufficient to reimburse us for any expenses or losses we may suffer. A successful liability claim or series of claims brought against us could require us to pay substantial amounts and cause our share price to decline and, if judgments exceed our insurance coverage, could adversely affect our results of operations and business, including preventing or limiting the development and commercialization of any product candidates that we or our collaborators may develop.

Unstable market and economic conditions may have serious adverse consequences on our business, financial condition and stock price.

Global credit and financial markets have experienced extreme volatility and disruptions in the past several years, including severely diminished liquidity and credit availability, declines in consumer confidence, declines in economic growth, increases in unemployment rates and uncertainty about economic stability, and similar deterioration in the credit and financial markets and confidence in economic conditions may occur in the future. Our general business strategy may be adversely affected by any such economic downturn, volatile business environment or unpredictable and unstable market conditions. If the current equity and credit markets deteriorate, or do not improve, it may make any necessary debt or equity financing more difficult, more costly and more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our growth strategy, financial performance and stock price and could require us to delay or abandon clinical development plans. In addition, there is a risk that one or more of our current service providers, manufacturers or others with whom we have strategic relationships may not survive any difficult economic times, which could directly affect our ability to attain our operating goals.

As of September 30, 2018, we had cash and cash equivalents of $ million. While we are not aware of any downgrades, material losses or other significant deterioration in the fair value of our cash and cash equivalents since September 30, 2018, deterioration of the global credit and financial markets could negatively impact our current portfolio of cash equivalents or our ability to meet our financing objectives. Furthermore, our stock price may decline due in part to the volatility of the stock market and any general economic downturn.

If we or any of our contract manufacturers or other suppliers fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur significant costs.

We and any of our contract manufacturers and suppliers are subject to numerous federal, state and local environmental, health and safety laws, regulations and permitting requirements, including those governing laboratory procedures; the generation, handling, use, storage, treatment and disposal of hazardous and regulated materials and wastes; the emission and discharge of hazardous materials into the ground, air and water; and employee health and safety. Our operations involve the use of hazardous and flammable materials, including chemicals and biological and radioactive materials. Our operations also produce hazardous waste. We generally contract with third parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials. In the event of contamination or injury resulting from our use of hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. Under certain environmental laws, we could be held responsible for costs relating to any contamination at our current or past facilities and at third-party facilities. We also could incur significant costs associated with civil or criminal fines and penalties.

Compliance with applicable environmental laws and regulations may be expensive, and current or future environmental laws and regulations may impair our research and product development efforts. In addition, we cannot entirely eliminate the risk of accidental injury or contamination from these materials or wastes. Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials, this insurance may not provide adequate coverage against potential liabilities. We do not carry specific biological or hazardous waste insurance coverage, and our property, casualty and general liability insurance policies (under which we currently have an aggregate of approximately $10 million in coverage) specifically exclude coverage for damages and fines arising from biological or hazardous waste exposure or contamination. Accordingly, in the event of contamination or injury, we could be held liable for damages or be penalized with fines in an amount exceeding our resources, and our clinical trials or regulatory approvals for any product candidate we develop alone or with collaborators could be suspended, which could have a material adverse effect on our business and financial condition.

In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws, regulations and permitting requirements, and any third-party contract manufacturers and suppliers we engage will also be subject to such current and future regulations and requirements. These current or future laws, regulations and permitting requirements may impair our research, development or production efforts. Failure to comply with these laws, regulations and permitting requirements, either by us or by any third-party contract manufacturers and suppliers we engage, also may result in substantial fines, penalties or other sanctions or business disruption.

Our business operations, including our current and future relationships with third parties, will expose us to penalties for potential misconduct or improper activity, including non-compliance with regulatory standards and requirements.

Complex laws constrain our business and the financial arrangements and relationships through which we conduct our operations, including how we may research, market, sell and distribute product candidates alone or with collaborators. We are exposed to the risk of fraud or other misconduct by our employees, consultants and collaborators and, if we or our collaborators commence clinical trials and proceed to commercialization, our principal investigators and commercial partners, as well as healthcare professionals, third-party payors, patient organizations and customers. For example, misconduct by these parties could include intentional failures to comply with FDA regulations or the regulations applicable in the EU and other jurisdictions, provide accurate information to the FDA, the European Commission and other regulatory authorities, comply with healthcare fraud and abuse laws and regulations in the United States and abroad, report financial information or data accurately or disclose unauthorized activities to us. In particular, sales, marketing and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, misconduct, kickbacks, false and/or misleading statements, corruption of government officials, self-dealing and other abusive practices. These laws and regulations restrict or prohibit a wide range of pricing, discounting, marketing, promotion, sales commission and customer incentive programs and other business arrangements. Such misconduct also could involve the improper use or misrepresentation of information obtained in the course of clinical trials, creating fraudulent data in preclinical studies or clinical trials, illegal misappropriation of study materials or other property, or improper interactions with the FDA or other regulatory authorities, which could result in regulatory sanctions and cause serious harm to our or our collaborators' reputations.

Ensuring that our internal operations and current and future business arrangements with third parties comply with applicable healthcare laws and regulations will involve substantial costs. Additionally, we are subject to the risk that a person or government could allege such fraud or other misconduct, even if none occurred. It is possible that governmental authorities will conclude that our business practices do not comply with current or future statutes, regulations, agency guidance or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of the laws described above or any other governmental laws and regulations that may apply to us, we may be subject to significant penalties, including civil, criminal and administrative penalties, damages, fines, exclusion from government-funded healthcare programs, such as Medicare and Medicaid or similar programs in other countries or jurisdictions, additional reporting requirements and oversight if subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, disgorgement, individual imprisonment, contractual damages, reputational harm, diminished profits and the curtailment or restructuring of our operations. If any of the physicians or other providers or entities with whom we expect to do business are found to not be in compliance with applicable laws, they may be subject to similar penalties, such as criminal, civil or administrative sanctions, including exclusions from government-funded healthcare programs and imprisonment, which could affect our ability to operate our business. Further, defending against any such actions can be costly and time-consuming and may require significant personnel resources. Therefore, even if

we are successful in defending against any such actions that may be brought against us, our business may be impaired.

We intend to adopt, prior to the completion of this offering, a code of conduct applicable to all of our employees, but it is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent such activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from government investigations or other actions or lawsuits stemming from a failure to comply with applicable laws or regulations. Additionally, we are subject to the risk that a person could allege such fraud or other misconduct, even if none occurred. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could result in the imposition of any of the penalties discussed above and have a significant impact on our business and financial condition.

The recently passed Tax Cuts and Jobs Act of 2017 could adversely affect our business and financial condition.

On December 22, 2017, President Trump signed into law new legislation, known as the Tax Cuts and Job Act of 2017, or the Tax Act, that significantly revises the Internal Revenue Code of 1986, as amended, or the Code. The Tax Act, among other things, contains significant changes to corporate taxation, including reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, limitation of the tax deduction for interest expense to 30% of adjusted taxable income (except for certain small businesses), limitation of the deduction for net operating losses to 80% of current year taxable income and elimination of net operating loss carrybacks, one-time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, elimination of U.S. tax on foreign earnings (subject to certain important exceptions), immediate deductions for certain new investments instead of deductions for depreciation expense over time, and modifying or repealing many business deductions and credits (including reducing the business tax credit for certain clinical testing expenses incurred in the testing of certain drugs for rare diseases or conditions). Notwithstanding the reduction in the corporate income tax rate, the overall impact of the Tax Act is uncertain, and our business and financial condition could be adversely affected. In addition, it is unknown if and to what extent various states will conform to the Tax Act. The impact of the Tax Act on holders of our common stock is likewise uncertain and could be adverse. We urge our stockholders to consult with their legal and tax advisors with respect to this legislation and the potential tax consequences of investing in or holding our common stock.

We are subject to complex tax rules relating to our business, and any audits, investigations or tax proceedings could have a material adverse effect on our business, results of operations and financial condition.

We are subject to income and non-income taxes in the United States. Income tax accounting often involves complex issues, and judgment is required in determining our provision for income taxes and other tax liabilities. We recently formed a subsidiary in Australia and may operate in other non-US jurisdictions in the future. We could become subject to income and non-income taxes in non-US jurisdictions as well. In addition, many jurisdictions have detailed transfer pricing rules, which require that all transactions with non-resident related parties be priced using arm's length pricing principles within the meaning of such rules. The application of withholding tax, goods and services tax, sales taxes and other non-income taxes is not always clear and we may be subject to tax audits relating to such withholding or non-income taxes. We believe that our tax positions are reasonable and our tax reserves are adequate to cover any potential liability. We are currently not subject to any tax audits. However, the Internal Revenue Service or other taxing authorities may disagree with our positions. If the Internal Revenue Service or any other tax authorities were successful in challenging our positions, we may be liable for additional tax and penalties and interest related thereto or other taxes, as applicable, in excess of any reserves established therefor, which may have a significant impact on our results and operations and future cash flow.

We may not be able to utilize all, or any, of our net operating loss carryforwards.

We have incurred substantial losses during our history, do not expect to become profitable in the near future, and we may never achieve profitability. As of December 31, 2017, we had U.S. federal and state net operating loss carryforwards of approximately $20.1 million and $19.4 million, respectively. Our federal net operating loss carryforwards begin to expire in 2030, and the state net operating loss carryforwards begin to expire in 2025. In addition, we have U.S. federal and state research and development tax credits of $1.7 million and an amount less than $0.1 million as of December 31, 2017, respectively, available to offset future U.S. federal and state income taxes, which begin to expire in 2027 and 2030, respectively. Unused losses generated in taxable years ending after December 31, 2017 will not expire and may be carried forward indefinitely, but will be deductible only to the extent of 80% of current year taxable income (computed without regard to the deduction for the net operating losses) in any given year. It is uncertain if and to what extent various states will conform to the newly enacted federal tax law.

As of December 31, 2017, we have a valuation allowance for the full amount of our net deferred tax assets as the realization of the net deferred tax assets is not determined to be more likely than not. In addition, Sections 382 and 383 of the Code limit a corporation's ability to utilize its net operating loss carryforwards and certain other tax attributes (including research credits) to offset any future taxable income or tax if the corporation experiences a cumulative ownership change of more than 50% over any rolling three-year period. State net operating loss carryforwards (and certain other tax attributes) may be similarly limited. A Section 382 ownership change can therefore result in significantly greater tax liabilities than a corporation would incur in the absence of such a change, and any increased liabilities could adversely affect the corporation's business, results of operations, financial condition and cash flow. We have not yet determined if any prior change in the ownership of our equity or any change in such ownership in connection with this offering, would trigger a Section 382 ownership change. It is possible that such a Section 382 ownership change has already occurred in prior periods. Furthermore, additional ownership changes may occur in the future as a result of events over which we will have little or no control, including purchases and sales of our equity by our 5% stockholders, the emergence of new 5% stockholders, additional equity offerings or redemptions of our stock or certain changes in the ownership of any of our 5% stockholders. As a result, our pre-2018 net operating loss carryforwards (and research tax credits) may expire prior to being used, and our net operating loss carryforwards and tax credits generated in 2018 and thereafter will be subject to a percentage limitation, upon an ownership change. Similar provisions of state tax law may also apply to limit our use of accumulated state tax attributes. As a result, even if we attain profitability, we may be unable to use all or a material portion of our NOLs and other tax attributes, which could adversely affect our future cash flows.

Risks related to this offering and owning our common stock

An active trading market for our common stock may not develop, and you may not be able to sell your shares at or above the initial public offering price.

Prior to this offering, there has been no public market for shares of our common stock. Although we anticipate that our common stock will be approved for listing on Nasdaq, an active trading market for our common stock may never develop or be sustained following this offering. The lack of an active trading market may impair your ability to sell your shares at the time you wish to sell them or at a price that you consider reasonable, reduce the market value of your shares, impair our ability to raise capital and impair our ability to attract, motivate and retain our employees through equity incentive awards. The initial public offering price of our common stock will be determined through negotiations between us and the underwriters, and it may not be indicative of the market price of our common stock in an open market after this offering. Consequently, you may not be able to sell your common stock at or above the initial public offering price and may lose a portion or all of your investment.

We expect that our common stock price will fluctuate significantly, which could result in substantial losses for purchasers of shares in this offering.

Our stock price is likely to be volatile. You should invest in our common stock only if you can withstand a significant loss and wide fluctuations in the market value of your investment. The market price for our common stock may be influenced by many factors, including those discussed in this “Risk factors” section and the following:

- inconsistent trading volume levels of our common stock;
- announcements or expectations regarding debt or equity financing efforts;
- sales of common stock by us, our insiders or our other stockholders;
- actual or anticipated fluctuations in our financial condition and operating results;
- failure to meet or exceed financial estimates and projections of the investment community or that we provide to the public;
- results from or delays in our studies or trials, or those of our collaborators, competitors or companies perceived to be similar to us;
- delay, failure or discontinuation of any of our product development and research programs, or those of our collaborators, competitors or companies perceived to be similar to us;
- announcements about new research programs or product candidates from us or our collaborators, our competitors or companies perceived to be similar to us;
- announcements by us, our collaborators, our competitors or companies perceived to be similar to us relating to significant acquisitions, strategic partnerships or alliances, joint ventures, collaborations or capital commitments;
- actual or anticipated changes in our growth rate relative to our competitors or companies perceived to be similar to us;
- fluctuations in the valuation of our collaborators, our competitors or companies perceived to be comparable to us;
- a lack of, limited or withdrawal of coverage by security analysts, or positive or negative recommendations by them;
- actual or expected changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- publication of research reports about us, genome editing or the biopharmaceutical and agricultural biotechnology industries;
- developments or changing views regarding the use of genomic products, including those that involve genome editing;
- our ability to effectively manage our growth;
- the recruitment or departure of key personnel;
- the results of any efforts by us to identify, develop, acquire or in-license additional product candidates, products or technologies;

- unanticipated serious safety concerns related to the use of any of our product candidates, or those of our competitors or companies perceived to be similar to us;
- the termination of a collaboration agreement, licensing agreement or other strategic arrangement or the inability to establish additional strategic arrangements on favorable terms, or at all;
- regulatory actions with respect to any of our product candidates, or those of our competitors or companies perceived to be similar to us;
- developments or disputes concerning patent applications, issued patents or other proprietary rights;
- regulatory or legal developments in the United States and other countries;
- changes in physician, hospital, healthcare provider or agricultural practices that may make our or our collaborators' products less useful;
- changes in the structure of healthcare payment systems;
- significant lawsuits, such as products liability, patent or stockholder litigation; and
- general economic, industry and market conditions.

These and other market and industry factors may cause the market price and demand for our common stock to fluctuate substantially, regardless of our actual operating performance. These factors may have a material adverse effect on the market price and liquidity of our common stock, which may limit or prevent you from readily selling your shares of common stock and may affect our ability to obtain financing or enter into desired strategic relationships.

We could be subject to securities class action litigation.

In the past, securities class action litigation has often been brought against a company following a decline in the market price of its securities. This risk is especially relevant for us because biopharmaceutical companies have experienced significant stock price volatility in recent years. If we face such litigation, it could result in substantial costs and a diversion of management's attention and resources, which could harm our business.

If you purchase shares of common stock in this offering, you will suffer immediate dilution of your investment.

The initial public offering price of our common stock will be substantially higher than the net tangible book value per share of our common stock. Therefore, if you purchase shares of our common stock in this offering, you will pay a price per share that substantially exceeds our net tangible book value per share after this offering. Based on an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, you will experience immediate dilution of $ per share, representing the difference between our pro forma as adjusted net tangible book value per share, after giving effect to this offering, and the assumed initial public offering price. As of September 30, 2018, there were shares subject to outstanding options with a weighted-average exercise price of $ per share. To the extent these outstanding options are ultimately exercised, you will incur further dilution. In addition, purchasers of common stock in this offering will have contributed approximately % of the aggregate price paid by all purchasers of our stock but will own only approximately % of our common stock outstanding after this offering. For a further description of the dilution that you will experience immediately after this offering, see "Dilution."

A significant portion of our total outstanding shares is restricted from immediate resale but may be sold into the market in the near future, which could cause the market price of our common stock to decline significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market, or the perception in the market that the holders of a large number of shares of common stock intend to sell shares, could reduce the market price of our common stock. After this offering and after giving effect to the conversion of all outstanding shares of our convertible preferred stock into shares of our common stock upon the closing of this offering, we will have shares of common stock outstanding, or if the underwriters exercise their option to purchase additional shares in full, in each case based on the 81,390,126 shares of our common stock outstanding as of September 30, 2018, assuming the conversion of all outstanding shares of our preferred stock. Of these shares, the shares, or shares if the underwriters exercise their option to purchase additional shares in full, we are selling in this offering may be resold in the public market immediately, unless purchased by our affiliates. The remaining shares are currently restricted under securities laws or as a result of lock-up or other agreements, but will be able to be sold after this offering as described in the "Shares eligible for future sale" section of this prospectus. Approximately shares will be available for sale in the public market beginning 180 days after the date of this prospectus following the expiration of lock-up agreements between our stockholders and the underwriters. JP Morgan Securities LLC, Goldman Sachs & Co. LLC and Jefferies LLC may release these stockholders from their lock-up agreements with the underwriters at any time and without notice, except for officers and directors, for whom notice of such waiver would be provided two business days before the effective date thereof, which would allow for earlier sales of shares in the public market.

In addition, as of September 30, 2018, up to shares of common stock that are either subject to outstanding options or reserved for future issuance under our employee benefit plans will become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules, the lock-up agreements and Rule 144 and Rule 701 under the Securities Act of 1933, as amended, or the Securities Act. If these additional shares of common stock are sold, or if it is perceived that they will be sold, in the public market, the trading price of our common stock could decline.

Moreover, after this offering, holders of an aggregate of shares of our common stock will have rights, subject to conditions, to require us to file registration statements covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders. We also plan to register all shares of common stock that we may issue under our equity compensation plans or that are issuable upon exercise of outstanding options. Once we register these shares, they can be freely sold in the public market upon issuance and once vested, subject to volume limitations applicable to affiliates and the lock-up agreements described in "Underwriting." If substantial portions of these additional shares are sold, or if it is perceived that they will be sold, in the public market, the market price of our common stock could decline.

After this offering, our executive officers, directors and significant stockholders will have the ability to directly or indirectly influence all matters submitted to stockholders for approval.

Our executive officers, directors, current 5% or greater stockholders and affiliated entities will beneficially own approximately % of the outstanding shares of our common stock after this offering, assuming no exercise of the underwriters' option to purchase additional shares and assuming that group does not participate in this offering. As a result, these stockholders, acting together, will have significant influence over all matters that require approval by our stockholders, including the election of directors and approval of significant corporate transactions. Corporate action might be taken even if other stockholders, including those who purchase shares in this offering, oppose them. This concentration of ownership might also have the effect of delaying or preventing a change of control of our company that other stockholders may view as beneficial.

We have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

Our management will have broad discretion in the application of the net proceeds from this offering, and we could spend the proceeds in ways that do not improve our results of operations or enhance the value of our common stock. We expect that we will use the net proceeds from this offering to advance and expand our clinical and preclinical development programs and for working capital and other general corporate purposes, which may include the costs of establishing a manufacturing facility, as set forth under "Use of proceeds." However, our use of these proceeds may differ substantially from our current plans. The failure by our management to apply these funds effectively could harm our business and financial condition. Pending their use, we may invest the net proceeds from this offering in a manner that does not produce income or that loses value. These investments may not yield a favorable return to our investors.

We do not currently intend to pay dividends on our common stock.

We do not intend to pay any dividends to holders of our common stock for the foreseeable future. We currently intend to invest our future earnings, if any, to fund our growth. Therefore, you are not likely to receive any dividends on your common stock for the foreseeable future, and the success of an investment in our common stock will depend upon any future appreciation in its value. Consequently, you may need to sell all or part of your common stock after price appreciation, which may never occur, as the only way to realize any future gains on your investment.

If securities or industry analysts do not publish research or reports about us and our business, or if they issue an adverse or misleading opinion regarding our common stock, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us and our business. We do not currently have, and may never obtain, research coverage by securities and industry analysts. If no or few securities or industry analysts commence coverage of us, the trading price for our stock would be negatively impacted. In the event we obtain securities or industry analyst coverage, if any of the analysts who cover us issue an adverse or misleading opinion regarding us, our business model, our intellectual property or our stock performance, or if our preclinical studies and clinical trials and operating results fail to meet the expectations of analysts, our stock price would likely decline. If one or more of these analysts ceases coverage of us or fails to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

Provisions in our amended and restated certificate of incorporation and restated bylaws that will become effective upon the closing of this offering or Delaware law might discourage, delay or prevent a change in control of our company or changes in our management and therefore depress the trading price of our common stock.

Provisions in our amended and restated certificate of incorporation and our restated bylaws, which will become effective upon the closing of this offering, may discourage, delay or prevent a merger, acquisition or other change in control of our company that stockholders may consider favorable, including transactions in which you might otherwise receive a premium for your shares. These provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock, thereby depressing the market price of our common stock. In addition, because our board of directors is responsible for appointing the members of our management team, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. Among other things, these provisions include those establishing:

- a classified board of directors with three-year staggered terms, which may delay the ability of stockholders to change the membership of a majority of our board of directors;

- no cumulative voting in the election of directors, which limits the ability of minority stockholders to elect director candidates;
- the exclusive right of our board of directors to elect a director to fill a vacancy created by the expansion of the board of directors or the resignation, death or removal of a director, which prevents stockholders from filling vacancies on our board of directors;
- the ability of our board of directors to authorize the issuance of shares of preferred stock and to determine the terms of those shares, including preferences and voting rights, without stockholder approval, which could be used to significantly dilute the ownership of a hostile acquirer;
- the ability of our board of directors to alter our bylaws without obtaining stockholder approval;
- the required approval of the holders of at least two-thirds of the shares entitled to vote at an election of directors to adopt, amend or repeal our bylaws or repeal the provisions of our amended and restated certificate of incorporation regarding the election and removal of directors;
- a prohibition on stockholder action by written consent, which forces stockholder action to be taken at an annual or special meeting of our stockholders;
- the requirement that a special meeting of stockholders may be called only by the chairman of the board of directors, our chief executive officer (or our president, in the absence of a chief executive officer) or a majority of our board of directors, which may delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors; and
- advance notice procedures that stockholders must comply with in order to nominate candidates to our board of directors or to propose matters to be acted upon at a stockholders' meeting, which may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of us.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the General Corporation Law of the State of Delaware, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner.

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware and the federal district courts of the United States will be the exclusive forums for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated certificate of incorporation provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for (1) any derivative action or proceeding brought on our behalf, (2) any action asserting a claim for breach of a fiduciary duty owed by any of our directors, officers or other employees to us or our stockholders, (3) any action asserting a claim arising pursuant to any provision of the General Corporation Law of the State of Delaware, our amended and restated certificate of incorporation or our amended and restated bylaws, (4) any action to interpret, apply, enforce or determine the validity of our amended and restated certificate of incorporation or our amended and restated bylaws, or (5) any action asserting a claim governed by the internal affairs doctrine. Our amended and restated certificate of incorporation will further provide that the federal district courts of the United States will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act. These exclusive forum provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and other employees. For

example, stockholders who do bring a claim in the Court of Chancery could face additional litigation costs in pursuing any such claim, particularly if they do not reside in or near the State of Delaware. The Court of Chancery and federal district courts may also reach different judgments or results than would other courts, including courts where a stockholder considering an action may be located or would otherwise choose to bring the action, and such judgments or results may be more favorable to us than to our stockholders. Some companies that adopted a similar federal district court forum selection provision are currently subject to a suit in the Court of Chancery by stockholders who assert that the provision is not enforceable. If a court were to find either choice of forum provision contained in our amended and restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could adversely affect our business and financial condition.

We are an "emerging growth company," and the reduced disclosure requirements applicable to emerging growth companies may make our common stock less attractive to investors.

We are an "emerging growth company," as defined in the JOBS Act. We will remain an emerging growth company until the earlier of (1) the last day of the fiscal year in which we have total annual gross revenue of $1.07 billion or more, (2) the last day of the fiscal year following the fifth anniversary of the date of the completion of this offering, (3) the date on which we have issued more than $1.0 billion in nonconvertible debt during the previous three years, or (4) the date on which we are deemed to be a large accelerated filer under the rules of the SEC which means the market value of our common shares that is held by non-affiliates exceeds $700 million as of the prior June 30th. For so long as we remain an emerging growth company, we are permitted and intend to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not emerging growth companies. These exemptions include:

- being permitted to present only two years of audited financial statements and only two years of related "Management's discussion and analysis of financial condition and results of operations" disclosure in this prospectus;
- not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended;
- not being required to comply with any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation or a supplement to the auditor's report providing additional information about the audit and the financial statements;
- reduced disclosure obligations regarding executive compensation in this prospectus and our periodic reports, proxy statements and registration statements; and
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

We have taken advantage of reduced reporting burdens in this prospectus. In particular, in this prospectus, we have provided only two years of audited financial statements and corresponding "Management's discussion and analysis of financial condition and results of operations" disclosure, and we have not included all of the executive compensation related information that would be required if we were not an emerging growth company. We cannot predict whether investors will find our common stock less attractive if we rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be reduced or more volatile. In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This allows an emerging growth company to delay the adoption of these accounting standards until they would otherwise apply to private companies. We have elected to take advantage of this extended transition period.

Special note regarding forward-looking statements

This prospectus contains forward-looking statements. All statements other than statements of present and historical facts contained in this prospectus, including statements regarding our future results of operations and financial position, business strategy, prospective products, planned preclinical or greenhouse studies and clinical or field trials, regulatory approvals, research and development costs, and timing and likelihood of success, as well as plans and objectives of management for future operations, may be forward-looking statements. Without limiting the foregoing, the words “anticipate,” “believe,” “could,” “expect,” “should,” “plan,” “intend,” “estimate,” “target,” “may,” “will,” “would,” “potential,” the negative thereof and similar words and expressions are intended to identify forward-looking statements.

Forward-looking statements are based on our management’s beliefs and assumptions and on information currently available to us. Such statements are subject to a number of known and unknown risks, uncertainties and assumptions, and actual results may differ materially from those expressed or implied in the forward-looking statements due to various factors, including, but not limited to, those identified under “Risk factors” and “Management’s discussion and analysis of financial condition and results of operations” and elsewhere in this prospectus. These risks and uncertainties include factors relating to:

- the initiation, cost, timing, progress and results of research and development activities, preclinical or greenhouse studies and clinical or field trials;
- our or our collaborators’ ability to identify, develop and commercialize product candidates;
- our or our collaborators’ ability to advance product candidates into, and successfully complete, clinical or field trials;
- the potential for off-target editing or other adverse events, undesirable side effects or unexpected characteristics associated with any of our product candidates;
- our or our collaborators’ ability to obtain and maintain regulatory approval of future product candidates, and any related restrictions, limitations and/or warnings in the label of an approved product candidate;
- the success of our existing collaboration agreements;
- our ability to enter into new collaboration arrangements;
- our ability to achieve our anticipated operating efficiencies as we commence manufacturing operations at our new facility;
- our ability to obtain funding for our operations;
- public perception about genome editing technology and its applications;
- our ability to obtain and maintain intellectual property protection for our technology and any of our product candidates;
- our or our collaborators’ ability to successfully commercialize any of our product candidates;
- the rate and degree of market acceptance of any of our product candidates;
- regulatory developments in the United States and international jurisdictions;
- competition in the genome editing, biopharmaceutical, biotechnology and agricultural biotechnology fields;
- potential manufacturing problems associated with any of our product candidates;

- potential liability lawsuits and penalties related to our technology, our product candidates and our current and future relationships with third parties;
- our ability to attract and retain key scientific and management personnel;
- our ability to effectively manage the growth of our operations;
- our ability to contract with third-party suppliers and manufacturers and their ability to perform adequately under those arrangements;
- our use of proceeds from this offering;
- our financial performance; and
- expected fluctuations of our stock price.

All forward-looking statements speak only as of the date of this prospectus, and except as required by applicable law, we do not plan to publicly update or revise any forward-looking statements contained herein, whether as a result of any new information, future events, changed circumstances or otherwise.

Industry and other data

We obtained the industry, statistical and market data in this prospectus from our own internal estimates and research as well as from industry and general publications and research, surveys and studies conducted by third parties. In some cases, we do not expressly refer to the sources from which this data is derived. In that regard, when we refer to one or more sources of this type of data in any paragraph, you should assume that other data of this type appearing in the same paragraph is derived from the same sources, unless otherwise expressly stated or the context otherwise requires. All of the market data used in this prospectus involves a number of assumptions and limitations, and you are cautioned not to give undue weight to such data. While we believe that each of these studies and publications is reliable, the industry in which we operate is subject to a high degree of uncertainty and risk due to a variety of important factors, including those described in “Risk factors.” These and other factors could cause results to differ materially from those expressed in the estimates made by third parties and by us.

Use of proceeds

We estimate that the net proceeds to us from the issuance and sale of shares of our common stock in this offering will be approximately $ million, assuming an initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us. If the underwriters' option to purchase additional shares from us is exercised in full, we estimate that our net proceeds will be approximately $ million. Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share would increase (decrease) the net proceeds to us from this offering by approximately $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the underwriting discounts and commissions and estimated offering expenses payable by us. Each increase (decrease) of 1.0 million in the number of shares we are offering would increase (decrease) the net proceeds to us from this offering by approximately $ million, assuming that the assumed initial public offering price stays the same and after deducting the underwriting discounts and commissions and estimated offering expenses payable by us.

The principal purposes of this offering are to obtain additional capital to support our operations, to create a public market for our common stock and to facilitate our future access to the public equity markets. We anticipate that we will use the net proceeds from this offering, together with our existing cash and cash equivalents, to advance and expand our clinical and preclinical development programs and for working capital and other general corporate purposes, which may include the costs of establishing a manufacturing facility.

This expected use of the net proceeds from this offering represents our intentions based upon our current plans and business conditions, which could change in the future as our plans and business conditions evolve. We may also use a portion of the net proceeds to in-license, acquire or invest in additional businesses, technologies, products or assets, although currently we have no specific agreements, commitments or understandings in this regard. As of the date of this prospectus, we cannot predict with certainty all of the particular uses for the net proceeds to be received upon the closing of this offering or the amounts that we will actually spend on the uses set forth above. Predicting the cost necessary to develop our technology and product candidates can be difficult, and we anticipate that we will need additional funds to complete our development programs. The amounts and timing of our actual expenditures and the extent of our preclinical studies and clinical trials and other development efforts may vary significantly depending on numerous factors, including the progress of our development efforts, the status of and results from preclinical studies and any clinical trials we may commence in the future, as well as any collaborations that we may enter into with third parties for our product candidates and any unforeseen cash needs. As a result, our management will retain broad discretion over the allocation of the net proceeds from this offering.

Based on our current operating plan and planned use of the net proceeds from this offering and our existing cash and cash equivalents, we estimate that such funds will be sufficient to enable us to fund our operating expenses and capital expenditure requirements through . We have based this estimate on assumptions that may prove to be incorrect, and we could use our available capital resources sooner than we currently expect. We may satisfy our future cash needs through the sale of equity securities, debt financings, working capital lines of credit, corporate collaborations or license agreements, grant funding, interest income earned on invested cash balances or a combination of one or more of these sources.

Pending our use of the net proceeds from this offering, we intend to invest the net proceeds in a variety of capital preservation investments, including short-term, investment-grade, interest-bearing instruments and U.S. government securities.

Dividend policy

We have never declared or paid any cash dividends on our capital stock. We intend to retain future earnings, if any, to finance the operation and expansion of our business and do not anticipate paying any cash dividends in the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors after considering our financial condition, results of operations, capital requirements, business prospects and other factors our board of directors deems relevant, and subject to any restrictions applicable to us contained in any future financing instruments.

Capitalization

The following table sets forth our cash and cash equivalents and capitalization as of September 30, 2018:

- on an actual basis;
- on a pro forma basis to reflect:
  - the automatic conversion of all outstanding shares of our convertible preferred stock into shares of common stock upon the closing of this offering; and
  - the filing and effectiveness of our amended and restated certificate of incorporation, which will occur upon the closing of this offering; and
- on a pro forma as adjusted basis to give further effect to our issuance and sale of shares of our common stock in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

The pro forma as adjusted information below is illustrative only, and our capitalization following the closing of this offering will be adjusted based on the actual initial public offering price and other terms of this offering determined at pricing. You should read this information in conjunction with our consolidated financial statements and the related notes included elsewhere in this prospectus and the "Management's discussion and analysis of financial condition and results of operations" section and other financial information contained in this prospectus.

	As of September 30, 2018		
	Actual	Pro forma	Pro forma as adjusted(1)
(in thousands, except share and per share amounts)		**(unaudited)**	
Cash and cash equivalents	$	$	$
Convertible preferred stock; $0.0001 par value per share: shares authorized; shares issued and outstanding, actual; no shares issued or outstanding, pro forma and pro forma as adjusted	$	$	$
Common stock; $0.000005 par value per share: shares authorized; shares issued and shares outstanding, actual; shares authorized, pro forma and pro forma as adjusted; shares issued and shares outstanding, pro forma; shares issued and outstanding, pro forma as adjusted			
Additional paid-in capital			
Accumulated deficit			
Treasury stock			
Total stockholders' (deficit) equity			
Total capitalization	$	$	$

(1) Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted amount of each of cash and cash equivalents, additional paid-in capital, total assets, total stockholders' (deficit) equity and total capitalization by $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions. Similarly, each increase (decrease) of 1.0 million shares in the number of shares offered by us at the assumed initial public offering price per share of $, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted amount of each of cash and cash equivalents, additional paid-in capital, total stockholders' (deficit) equity and total capitalization by approximately $ million, assuming the assumed initial public offering price per share remains the same and after deducting estimated underwriting discounts and commissions.

The number of shares of our common stock on a pro forma and pro forma as adjusted basis set forth in the table above is based on shares of our common stock outstanding as of September 30, 2018 and does not include:

- shares of common stock issuable upon exercise of stock options outstanding under our 2006 Plan and our 2015 Plan as of September 30, 2018, at a weighted-average exercise price of $ per share;
- shares of our common stock reserved for future issuance under our 2019 Plan, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under our 2019 Plan; and
- shares of our common stock reserved for future issuance under our 2019 ESPP, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under our 2019 ESPP.

Dilution

If you invest in our common stock in this offering, your ownership interest will be immediately diluted to the extent of the difference between the initial public offering price per share of our common stock and the pro forma as adjusted net tangible book value per share of our common stock after this offering.

As of September 30, 2018, we had a historical net tangible book value of $ million, or $ per share of common stock, based on shares of common stock outstanding as of such date. Our historical net tangible book value per share represents total tangible assets less total liabilities, divided by the number of shares of our common stock outstanding as of September 30, 2018.

Our pro forma net tangible book value as of September 30, 2018 was $ million, or $ per share. Pro forma net tangible book value represents the amount of our total tangible assets less total liabilities, after giving effect to the automatic conversion of all shares of our convertible preferred stock outstanding as of September 30, 2018 into an aggregate of shares of our common stock in connection with this offering. Pro forma net tangible book value per share represents our pro forma net tangible book value divided by the total number of shares outstanding as of September 30, 2018, after giving effect to the pro forma adjustment described above.

After giving further effect to the receipt of the net proceeds from our issuance and sale of shares of common stock in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, our pro forma as adjusted net tangible book value as of September 30, 2018 would have been approximately $ million, or approximately $ per share. This amount represents an immediate increase in pro forma net tangible book value of $ per share to our existing stockholders and an immediate dilution of approximately $ per share to new investors participating in this offering. We determine dilution by subtracting the pro forma as adjusted net tangible book value per share after this offering from the amount of cash that a new investor paid for a share of common stock. The following table illustrates this dilution:

Assumed initial public offering price per share		$
Historical net tangible book value (deficit) per share as of September 30, 2018	$	
Pro forma increase per share attributable to the conversion of our convertible preferred stock		
Pro forma net tangible book value per share as of September 30, 2018		
Increase in the pro forma net tangible book value per share attributable to this offering		
Pro forma as adjusted net tangible book value per share after this offering		
Dilution per share to new investors participating in this offering		$

The dilution information discussed above is illustrative only and will change based on the actual initial public offering price and other terms of this offering determined at pricing. Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted net tangible book value per share after this offering by $ per share, and dilution in pro forma net tangible book value per share to new investors purchasing common stock in this offering by $ per share, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions. An increase of 1.0 million shares in the number of shares

offered by us would increase our pro forma as adjusted net tangible book value per share after this offering by $ per share and decrease the dilution to new investors purchasing common stock in this offering by $ per share, assuming the assumed initial public offering price remains the same and after deducting estimated underwriting discounts and commissions. A decrease of 1.0 million shares in the number of shares offered by us would decrease our pro forma as adjusted net tangible book value per share after this offering by $ per share and increase the dilution to new investors purchasing common stock in this offering by $ per share, assuming the assumed initial public offering price remains the same and after deducting estimated underwriting discounts and commissions.

If the underwriters exercise their option to purchase additional shares of our common stock in full, the pro forma as adjusted net tangible book value per share after this offering would be $ per share, the increase in pro forma net tangible book value per share would be $ per share and the dilution per share to new investors would be $ per share, in each case based on the initial public offering price of $ per share, after deducting estimated underwriting discounts and commissions and the estimated offering expenses payable by us.

The following table summarizes, as of September 30, 2018, on the pro forma as adjusted basis described above, the total number of shares of common stock purchased from us on an as converted to common stock basis, the total consideration paid or to be paid and the average price per share paid or to be paid by existing stockholders and by new investors in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, before deducting the underwriting discounts and commissions and estimated offering expenses payable by us. As the table shows, new investors purchasing common stock in this offering will pay an average price per share substantially higher than our existing stockholders paid.

	Shares purchased		Total consideration		Average price per share
	Number	Percent	Amount	Percent	
Existing stockholders		%	$	100.0%	$
New investors					
Total		100.0%	$	100.0%	

If the underwriters exercise their option to purchase additional shares of our common stock in full, the percentage of shares of common stock held by existing stockholders will decrease to approximately % of the total number of shares of our common stock outstanding after this offering, and the number of shares held by new investors will increase to , or approximately % of the total number of shares of our common stock outstanding after this offering.

A $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase or decrease the total consideration paid by new investors by $ million and, in the case of an increase, would increase the percentage of total consideration paid by new investors by percentage points and, in the case of a decrease, would decrease the percentage of total consideration paid by new investors by percentage points, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same. An increase or decrease of 1.0 million shares in the number of shares offered by us, as set forth on the cover page of this prospectus, would increase or decrease the total consideration paid by new investors by $ million and, in the case of an increase, would increase the percentage of total consideration paid by new investors by % and, in the case of a decrease, would decrease the percentage of total consideration paid by new investors by percentage points, assuming the assumed initial public offering price per share remains the same and after deducting the underwriting discounts and commissions.

The foregoing tables and calculations (other than the historical net tangible book value calculation) are based on the number of shares of our common stock outstanding as of September 30, 2018, after giving effect to the automatic conversion of all outstanding shares of our convertible preferred stock into common stock in connection with this offering, and exclude:

- shares of common stock issuable upon exercise of stock options outstanding under our 2006 Plan and our 2015 Plan as of September 30, 2018, at a weighted-average exercise price of $ per share;
- shares of our common stock reserved for future issuance under our 2019 Plan, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under our 2019 Plan; and
- shares of our common stock reserved for future issuance under our 2019 ESPP, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under our 2019 ESPP.

To the extent that these outstanding stock options are exercised, new stock options are issued or we issue additional shares of common stock in the future, there will be further dilution to new investors. In addition, we may choose to raise additional capital because of market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans. If we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

Selected consolidated financial data

You should read the following selected consolidated financial data together with our consolidated financial statements and the related notes included elsewhere in this prospectus and “Management’s discussion and analysis of financial condition and results of operations.” We have derived the consolidated statement of operations data for the years ended December 31, 2016 and 2017 and the consolidated balance sheet data as of December 31, 2016 and 2017 from our audited consolidated financial statements included elsewhere in this prospectus. Our historical results are not necessarily indicative of the results that should be expected in any future period.

	Years ended December 31,	
(in thousands, except share and per share data)	**2016**	**2017**
Consolidated Statements of Operations Data:		
Revenue	$ 7,015	$ 6,484
Operating expenses:		
Research and development	9,675	20,324
General and administrative	6,168	8,016
Impairment of intangible assets	—	118
Total operating expenses	15,843	28,458
Loss from operations	(8,828)	(21,974)
Other income:		
Interest income	570	872
Other income	2	—
Total other income	572	872
Loss before income tax expense	(8,256)	(21,102)
Income tax benefit	5	—
Net loss and net loss attributable to common stockholders—basic and diluted	$ (8,251)	$ (21,102)
Net loss per share attributable to common stockholders—basic and diluted	$ (0.24)	$ (0.62)
Weighted-average shares of common stock outstanding—basic and diluted(1)	34,825,334	33,956,010
Pro forma net loss per share attributable to common stockholders—basic and diluted (unaudited)(1)		
Pro forma weighted-average shares of common stock outstanding—basic and diluted (unaudited)(1)		

(1) See Note 10 to our audited consolidated financial statements included elsewhere in this prospectus for an explanation of the method used to calculate the historical basic and diluted net loss per share of common stock and the weighted-average number of shares used in the computation of the per share amounts.

(in thousands)	As of December 31, 2016	2017
Consolidated Balance Sheet Data:		
Cash and cash equivalents	$ 93,423	$ 62,802
Working capital(1)	86,061	55,129
Total assets	98,414	72,682
Total liabilities	103,163	99,051
Accumulated deficit	(18,009)	(39,111)
Stockholders' (deficit) equity	(4,749)	(26,369)

(1) We define working capital as current assets less current liabilities. See our consolidated financial statements included elsewhere in this prospectus for further details regarding our current assets and current liabilities.

Management's discussion and analysis of financial condition and results of operations

You should read the following discussion and analysis of financial condition and operating results together with the section captioned "Selected consolidated financial data" and our consolidated financial statements and the related notes included elsewhere in this prospectus. This discussion contains forward-looking statements that involve risks and uncertainties. As a result of many factors, such as those set forth in the section of the prospectus captioned "Risk factors" and elsewhere in this prospectus, our actual results may differ materially from those anticipated in these forward-looking statements.

Overview

We are a leading genome editing company dedicated to improving life. We have developed a groundbreaking proprietary genome editing platform to treat human diseases and create healthy and sustainable food and agricultural solutions: we call this platform "ARCUS." The versatility and breadth of ARCUS support the ability to develop further product platforms in a variety of applications. We are initially focusing on three innovative and high value areas where we believe our technology addresses the limitations of other genome editing technologies: cancer immunotherapy (allogeneic CAR T cells), *in vivo* gene corrections and food and agriculture. We expect to enter the clinic with our gene-edited allogeneic CAR T cell lead candidate targeting CD19 in the first quarter of 2019. We believe our team, whom we call Precisioneers, has the deepest scientific experience and capabilities of all genome editing companies.

Since our formation in 2006, we have devoted substantially all of our resources to developing ARCUS, conducting research and development activities, recruiting skilled personnel, developing manufacturing processes, establishing our intellectual property portfolio and providing general and administrative support for these operations. We have financed our operations primarily with proceeds from the sale of our convertible preferred stock and upfront payments from licensing arrangements. Through September 30, 2018, we have raised approximately $136 million in gross proceeds from the sale of convertible preferred stock, and we received an upfront payment of $105 million under the Servier Agreement, as described below.

Since our inception, we have incurred significant operating losses and have not generated any revenue from the sale of products. Our ability to generate any product revenue or product revenue sufficient to achieve profitability will depend on the successful development and eventual commercialization of one or more of our product candidates or the product candidates of our collaborators for which we may receive milestone payments or royalties. Our net losses for the years ended December 31, 2016 and 2017 were $8.3 million and $21.1 million, respectively. As of December 31, 2017, we had an accumulated deficit of $39.1 million. We do not expect to generate revenue from sales of any products for the foreseeable future.

Our total operating expenses were $15.8 million and $28.5 million for the years ended December 31, 2016 and 2017, respectively. We expect our operating expenses to increase substantially in connection with the expansion of our product development programs. We will not generate revenue from product sales unless and until we successfully complete clinical development and obtain regulatory approval for one of our product candidates or the product candidates of our collaborators for which we may receive milestone payments or royalties. If we obtain regulatory approval for any of our product candidates, we expect to incur significant expenses related to developing our commercialization capability to support product sales, marketing and distribution. In addition, following the closing of this offering, we expect to incur additional costs associated with operating as a public company.

As a result of these anticipated expenditures, we will need additional financing to support our continuing operations. Until such time as we can generate significant revenue from product sales, if ever, we expect to

finance our cash needs through a combination of public or private equity or debt financings or other sources, which may include current and new collaborations with third parties. Adequate additional financing may not be available to us on acceptable terms, or at all. Our inability to raise capital as and when needed would have a negative impact on our financial condition and our ability to pursue our business strategy. We cannot assure you that we will ever generate significant revenue to achieve profitability.

Because of the numerous risks and uncertainties associated with the development of therapeutic and agricultural products, we are unable to predict the timing or amount of increased expenses or when or if we will be able to achieve or maintain profitability. Even if we are able to generate revenue from product sales, we may not become profitable. If we fail to become profitable or are unable to sustain profitability on a continuing basis, then we may be required to raise additional capital on terms that are unfavorable to us or we may be unable to continue our operations at planned levels and be forced to reduce or terminate our operations.

We currently conduct our operations through two reportable segments: Therapeutics and Plant Sciences. Our Therapeutics segment is focused on the development of products in the field of immuno-oncology and of novel products outside immuno-oncology to treat human diseases. Our Plant Sciences segment focuses on applying ARCUS to develop food and nutrition products through collaboration agreements with consumer-facing companies.

Collaborations

Servier

In February 2016, we entered into the Servier Agreement, pursuant to which we have agreed to develop allogeneic chimeric antigen receptor T cell therapies for up to six unique antigen targets selected by Servier. Upon selection of an antigen target by Servier, we have agreed to perform early-stage research and development on individual T cell modifications for the selected target, develop the resulting therapeutic product candidates through Phase 1 clinical trials and prepare clinical supply of such product candidates for use in Phase 2 clinical trials.

We received an upfront payment of $105.0 million under the Servier Agreement. We have the ability to receive total payments, including the upfront payment, option fees and milestone payments, in the aggregate across all six targets, of up to approximately $1.6 billion, as well as the payment of tiered royalties ranging from the mid-single digit percentages to the low double digit percentages on world-wide net sales. We also have the right to participate in the development and commercialization of any licensed products resulting from the collaboration through a 50/50 co-development and co-promotion option in the United States, subject to our payment of an option fee, which is exercisable after Servier’s commercial option exercise.

We recognized $4.8 million and $5.8 million in revenues under the Servier Agreement during 2016 and 2017, respectively. The amount recorded as deferred revenue was $100.2 million and $94.4 million as of December 31, 2016 and 2017, respectively. No development or sales-based milestones were received for the fiscal years ended December 31, 2016 and 2017.

Cargill

In February 2015, we entered into a commercial license agreement, as subsequently amended, with Cargill that is focused on targeting and modifying certain genes related to saturated oil production in canola plants license for an initial license fee, certain research funding and the right to receive royalties based on future sales. We refer to this agreement as the Cargill Agreement. Under the terms of the Cargill Agreement, we granted Cargill an exclusive research license under certain nucleases and technology, for 24 months, which term was subsequently extended through November 2018, and a non-exclusive license under certain know-how for the

length of the term for which we are eligible to receive royalties. Cargill may maintain certain exclusive rights by paying a one-time option fee. We recognized $1.6 million and $0.4 million in revenue during 2016 and 2017, respectively, under the Cargill Agreement.

Components of our results of operations

Revenue

To date, we have not generated any revenue from product sales and do not expect to generate any revenue from product sales in the foreseeable future. We record revenue from collaboration agreements, including amounts related to upfront payments, annual fees for licenses of our intellectual property and research and development funding.

Research and development expenses

Research and development expenses consist primarily of costs incurred for our research activities, including our discovery efforts and the development of our product candidates. These include the following:

- salaries, benefits and other related costs, including stock-based compensation expense, for personnel engaged in research and development functions;
- expenses incurred under agreements with third parties, including CROs and other third parties that conduct preclinical research and development activities and clinical trials on our behalf;
- costs of developing and scaling our manufacturing process and manufacturing drug products for use in our preclinical studies and future clinical trials, including the costs of CMOs that will manufacture our clinical trial material for use in our preclinical studies and potential future clinical trials;
- costs of outside consultants, including their fees and related travel expenses;
- costs of laboratory supplies and acquiring, developing and manufacturing preclinical study and clinical trial materials;
- license payments made for intellectual property used in research and development activities; and
- facility-related expenses, which include direct depreciation costs and expenses for rent and maintenance of facilities and other operating costs if specifically identifiable to research activities.

We expense research and development costs as incurred.

We track external research and development costs, including the costs of laboratory supplies and services, outsourced research and development, clinical trials, contract manufacturing, laboratory equipment and maintenance and certain other development costs, by product candidate when the costs are specifically identifiable to a product candidate. Internal and external costs associated with infrastructure resources, other research and development costs, facility related costs and depreciation and amortization that are not identifiable to a specific product candidate are included in the platform development, early-stage research and unallocated expenses category in the table below.

The following table summarizes our research and development expenses by product candidate or development program:

	Years ended December 31,		
	2016	2017	Increase
(in thousands)			
Direct research and development expenses by product candidate:			
CD19 external development costs	$ 385	$ 3,844	$ 3,459
Platform development, early-stage research and unallocated expenses:			
Employee-related costs	6,180	9,878	3,698
Laboratory supplies and services	1,005	2,183	1,178
Outsourced research and development	605	1,455	850
Laboratory equipment and maintenance	175	324	149
Facility related costs	450	832	382
Depreciation and amortization	573	1,205	632
Other research and development costs	302	603	301
Total research and development expenses	$9,675	$20,324	$ 10,649

Research and development activities are central to our business model. We expect that our research and development expenses will continue to increase substantially for the foreseeable future and will comprise a larger percentage of our total expenses as we initiate a Phase 1/2a clinical trial for CD19 and continue to discover and develop additional product candidates.

We cannot determine with certainty the duration and costs of future clinical trials of CD19 or any other product candidate we may develop or if, when or to what extent we will generate revenue from the commercialization and sale of any product candidate for which we obtain marketing approval. We may never succeed in obtaining marketing approval for any product candidate. The duration, costs and timing of clinical trials and development of CD19 and any other our product candidate we may develop will depend on a variety of factors, including:

- the scope, rate of progress, expense and results of clinical trials of CD19, as well as of any future clinical trials of other product candidates and other research and development activities that we may conduct;
- uncertainties in clinical trial design and patient enrollment rates;
- the actual probability of success for our product candidates, including their safety and efficacy, early clinical data, competition, manufacturing capability and commercial viability;
- significant and changing government regulation and regulatory guidance;
- the timing and receipt of any marketing approvals; and
- the expense of filing, prosecuting, defending and enforcing any patent claims and other intellectual property rights.

A change in the outcome of any of these variables with respect to the development of a product candidate could mean a significant change in the costs and timing associated with the development of that product candidate. For example, if the FDA or another regulatory authority were to require us to conduct clinical trials beyond those that we anticipate will be required for the completion of clinical development of a product candidate, or if we experience significant delays in our clinical trials due to slower than expected patient enrollment or other reasons, we would be required to expend significant additional financial resources and time on the completion of clinical development.

General and administrative expenses

General and administrative expenses consist primarily of salaries and other related costs, including stock-based compensation, for personnel in our executive, finance, business development, operations and administrative functions. General and administrative expenses also include legal fees relating to intellectual property and corporate matters; professional fees for accounting, auditing, tax and consulting services; insurance costs; travel expenses; and facility-related expenses, which include direct depreciation costs and expenses for rent and maintenance of facilities and other operating costs that are not specifically attributable to research activities.

We expect that our general and administrative expenses will increase in the future as we increase our personnel headcount to support our continued research activities and development of product candidates. Following this offering, we also expect to incur increased expenses associated with being a public company, including costs of accounting, audit, legal, regulatory and tax-related services associated with maintaining compliance with Nasdaq and SEC requirements; director and officer insurance costs; and investor and public relations costs.

Interest income

Interest income consists of interest income earned on our cash and cash equivalents.

Income taxes

Since our inception in 2006, we have generated cumulative federal and state net operating loss and R&D credit carryforwards for which we have not recorded any net tax benefit due to the uncertainty around utilizing these tax attributes within their respective carryforward periods. As of December 31, 2017, we had federal and state net operating loss carryforwards of $20.1 million and $19.4 million, respectively, which may be available to offset future taxable income. The U.S. federal and state net operating loss carryforwards begin to expire in 2030 and 2025, respectively. As of December 31, 2017, we also had federal research and development tax credit carryforwards of $1.7 million, which begin to expire in 2027. As of December 31, 2017, we also have federal contribution carryforwards of less than $0.1 million, which begin to expire in 2020. We have recorded a full valuation allowance against our net deferred tax assets at each balance sheet date.

On December 22, 2017, the Tax Cuts and Jobs Act was signed into United States law. The Tax Cuts and Jobs Act includes a number of changes to existing tax law, including, among other things, a permanent reduction in the federal corporate income tax rate from a top marginal tax rate of 35% to a flat rate of 21%, effective as of January 1, 2018, as well as a limitation of the deduction for net operating losses to 80% of annual taxable income and elimination of net operating loss carrybacks, in each case, for losses arising in taxable years beginning after December 31, 2017 (though any such net operating losses may be carried forward indefinitely). The federal tax rate change resulted in a reduction in the gross amount of our deferred tax assets and liabilities recorded as of December 31, 2017, and a corresponding reduction in our valuation allowance. As a result, no income tax expense or benefit was recognized as of the enactment date of the Tax Cuts and Jobs Act.

Results of operations

Comparison of years ended December 31, 2016 and 2017

The following table summarizes our results of operations for the years ended December 31, 2016 and 2017, together with the changes in those items in dollars:

	Years ended December 31,		
	2016	2017	Change
(in thousands)			
Revenue	$ 7,015	$ 6,484	$ (531)
Operating expenses:			
Research and development	9,675	20,324	10,649
General and administrative	6,168	8,016	1,848
Impairment of intangible assets	—	118	118
Total operating expenses	15,843	28,458	12,615
Loss from operations	(8,828)	(21,974)	(13,146)
Other income:			
Interest income	570	872	302
Other income	2	—	(2)
Total other income	572	872	300
Loss before income tax expense	(8,256)	(21,102)	(12,846)
Income tax benefit	5	—	(5)
Net loss	$ (8,251)	$ (21,102)	$ (12,851)

Revenue

Revenue for the year ended December 31, 2016 was $7.0 million, compared to $6.5 million for the year ended December 31, 2017. The decrease of $0.5 million in revenue during the year ended December 31, 2017 was the result of a decrease of $1.2 million in license fees and research funding from Cargill and a $0.3 million decrease in license fees from a biopharmaceutical manufacturer whose contract ended in 2016, partially offset by an increase in $1.0 million in the amount of revenue recognized from the Servier Agreement. The $105.0 million upfront payment from Servier contained multiple deliverables that were bundled into a single unit of accounting and is being recognized as revenue ratably over the estimated performance period of 9.5 years. The year ended December 31, 2017 was the first full year of operation for the Servier Agreement.

Revenue from the Servier Agreement was $4.8 million and $5.8 million for the years ended December 31, 2016 and 2017, respectively. Revenue from the Cargill Agreement was $1.6 million and $0.4 million for the years ended December 31, 2016 and 2017, respectively.

Research and development expenses

	Years ended December 31,		
	2016	2017	Change
(in thousands)			
Direct research and development expenses by program:			
CD19 external development costs	$ 385	$ 3,844	$ 3,459
Platform development, early-stage research and unallocated expenses:			
Employee-related costs	6,180	9,878	3,698
Laboratory supplies and services	1,005	2,183	1,178
Outsourced research and development	605	1,455	850
Laboratory equipment and maintenance	175	324	149
Facility related costs	450	832	382
Depreciation and amortization	573	1,205	632
Other research and development costs	302	603	301
Total research and development expenses	$9,675	$20,324	$10,649

Research and development expenses for the year ended December 31, 2016 were $9.7 million, compared to $20.3 million for the year ended December 31, 2017. The increase of $10.6 million was primarily due to a $3.5 million increase in direct research and development expenses related to our CD19 program as we incurred a $2.5 million increase in lab supplies and $1.0 million in payments to CMOs for the production of clinical trial material and increases in platform development and early-stage research expenses of $7.1 million for this same period. Contributing to this increase was a $3.7 million increase in employee-related costs as our research and development headcount grew to support our technology platform development and manufacturing capabilities. Lab supplies and services increased $1.2 million and laboratory equipment and maintenance increased $0.1 million to support our increased research and development efforts, excluding our CD19 program. Outsourced research and development increased $0.9 million due to an increase in payments to external scientific service providers and consultants for work performed on our development programs, excluding our CD19 program. Facility related costs increased $0.4 million as a result of our leasing additional space in our Durham, N.C. facility. Depreciation and amortization increased $0.6 million due to an increase in lab equipment purchases and leasehold improvements. Other research and development expenses increased $0.3 million.

General and administrative expenses

General and administrative expenses were $6.2 million for the year ended December 31, 2016, compared to $8.0 million for the year ended December 31, 2017. The increase of $1.8 million was primarily due to an increase of $0.6 million in employee-related costs as we increased our general and administrative headcount. Also contributing to the increase in general and administrative expenses were $0.5 million in facility related costs, including equipment, $0.3 million in information technology costs, $0.2 million in consulting fees and $0.2 million in depreciation and amortization. These increases were partially offset by a decrease of $0.3 million in legal fees as we incurred legal fees in connection with the Servier agreement in 2016 that did not recur in 2017.

Interest income

Interest income was $0.6 million for the year ended December 31, 2016 compared to $0.9 million for the year ended December 31, 2017. The increase of $0.3 million of interest income generated on our cash and cash

equivalent balances for the year ended December 31, 2017 compared to the year ended December 31, 2016 was the result of higher interest rates and having higher cash balances invested in 2017 compared to 2016.

Segment results

The following tables summarize segment revenues and segment operating loss for the years ended December 31, 2016 and 2017 (see Note 14 to our consolidated financial statements included elsewhere in this prospectus for additional information regarding our segments):

	Years ended December 31,	
	2016	**2017**
(in thousands)		
Revenue:		
Therapeutics	$ 5,375	$ 6,064
Plant Sciences	1,640	420
Total segment revenue	7,015	6,484
Segment operational cash expenditures:		
Therapeutics	$ 5,763	$ 11,062
Plant Sciences	831	1,699
Total segment operational cash expenditures	6,594	12,761
Allocation of centralized research and development operational cash expenditures:		
Therapeutics	$ 2,952	$ 6,948
Plant Sciences	774	1,164
Total allocation of centralized research and development operational cash expenditures	3,726	8,112
Segment operating income (loss):		
Therapeutics	$ (3,340)	$ (11,946)
Plant Sciences	35	(2,443)
Total segment operating loss	(3,305)	(14,389)

We evaluate the operating performance of each segment based on segment operating loss. Segment operating loss is derived by deducting operational cash expenditures from revenue. Operational cash expenditures are cash disbursements made that are specifically identifiable to the reportable segment (including specifically identifiable research and development and property, equipment and software expenditures) plus an allocation of centralized research and development expenditures for early stage research, nuclease development and the purchase of general laboratory supplies. These expenditures are allocated to the segments based on headcount. The reportable segment and centralized research and development operational cash expenditures include cash disbursements for compensation, lab supplies, purchases of property, equipment and software and procuring services from CROs, CMOs and research organizations. We do not allocate general operational expenses or non-cash income statement amounts to our reportable segments.

Therapeutics segment

Revenue for the year ended December 31, 2016 was $5.4 million, compared to $6.1 million for the year ended December 31, 2017. The increase of $0.7 million was attributable to a $1.0 million increase in the amount of revenue recognized from the Servier Agreement, partially offset by a $0.3 million decrease in license fees from

a biopharmaceutical manufacturer whose contract ended in 2016, as described above in "—Revenue." Segment operational cash expenditures for the year ended December 31, 2016 were $5.8 million, compared to $11.1 million for the year ended December 31, 2017. The increase of $5.3 million was due to increases in lab supply and property, equipment and software expenditures, payments made to service providers for research and development and contract manufacturing services, and an increase in employee headcount and related costs. Segment operating loss increased $8.6 million from $3.3 million for the year ended December 31, 2016 to $11.9 million for the year ended December 31, 2017 primarily due to the factors discussed above.

Plant Sciences segment

Revenue for the year ended December 31, 2016 was $1.6 million, compared to $0.4 million for the year ended December 31, 2017. The decrease of $1.2 million is the result of lower license fee and research funding revenue from the Cargill Agreement, as described above in "—Revenue." Segment operational cash expenditures for the year ended December 31, 2016 were $0.8 million, compared to $1.7 million for the year ended December 31, 2017. The increase of $0.9 million was primarily due to an increase in employee headcount and related costs. Segment operating income of less than $0.1 million for the year ended December 31, 2016 compared to segment operating loss $2.4 million for the year ended December 31, 2017 represented an increase in segment operating loss of $2.5 million primarily due to the factors discussed above.

Liquidity and capital resources

Since our inception, we have incurred significant operating losses. We expect to incur significant expenses and operating losses for the foreseeable future as we advance the preclinical and clinical development of our product candidates. We expect that our research and development and general and administrative costs will continue to increase, including in connection with conducting preclinical studies and clinical trials for our product candidates, contracting with CMOs and building out internal capacity to have product manufactured to support preclinical studies and clinical trials, expanding our intellectual property portfolio and providing general and administrative support for our operations. As a result, we will need additional capital to fund our operations, which we may obtain from additional equity or debt financings, collaborations, licensing arrangements or other sources.

We do not currently have any approved products and have never generated any revenue from product sales. To date, we have financed our operations primarily with proceeds from the sale of our convertible preferred stock and upfront payments from licensing arrangements. Since inception, we have received a one-time upfront payment of $105.0 million under the Servier Agreement and raised a total of $135.7 million through September 30, 2018 in gross proceeds from the sale of shares of our convertible preferred stock.

Cash flows

Our cash and cash equivalents totaled $93.4 million and $62.8 million as of December 31, 2016 and 2017, respectively. We had no indebtedness as of December 31, 2016 or 2017.

The following table summarizes our sources and uses of cash for the periods presented:

	Years ended December 31,	
	2016	**2017**
(in thousands)		
Net cash provided by (used in) operating activities	$ 92,274	$ (24,169)
Net cash used in investing activities	(2,075)	(5,515)
Net cash used in financing activities	(12,376)	(937)
Increase (decrease) in cash and cash equivalents	$ 77,823	$ (30,621)

Cash flows for the year ended December 31, 2017

Operating activities

Net cash used in operating activities for the year ended December 31, 2017 was $24.2 million, primarily consisting of our net loss of $21.1 million as we incurred expenses associated with research activities on our CD19 program and research activities on other applications for our technology and incurred general and administrative expenses. In addition, we had a loss of $0.1 million on the disposal of assets and non-cash charges of $2.0 million for depreciation and stock-based compensation expense and the impairment of intangible assets. Net cash used in operating activities was also impacted by $5.1 million in changes in operating assets and liabilities, including $6.2 million in deferred revenue and $0.6 million in prepaid expenses and other current assets, partially offset by changes of $0.9 million in accounts payable, $0.7 million in accrued expenses and other current liabilities and $0.1 million in other assets.

Investing activities

Net cash used in investing activities for the year ended December 31, 2017 was $5.5 million, which was attributable to purchases of property, equipment and software of $5.6 million, partially offset by $0.1 million from the proceeds from the disposal of equipment.

Financing activities

Net cash used in financing activities for the year ended December 31, 2017 was $0.9 million, consisting of repurchases of common stock of $1.0 million, partially offset by less than $0.1 million in proceeds from stock option exercises.

Cash flows for the year ended December 31, 2016

Operating activities

Net cash provided by operating activities for the year ended December 31, 2016 was $92.3 million, primarily consisting of a $106.3 million in payments under the Servier Agreement and the Cargill Agreement, the majority of which was a $105 million upfront payment received under the Servier Agreement. These payments were partially offset by our net loss of $8.3 million as we incurred expenses associated with research activities related to our CD19 program and other applications for our technology and incurred general and administrative expenses. In addition, we had a loss of less than $0.1 million on the disposal of assets and non-cash charges of $0.8 million for depreciation and stock-based compensation expense. Net cash provided by operating activities was also impacted by $0.4 million in changes in operating assets and liabilities including $0.1 million in accounts payable and $0.8 million in accrued expenses and other liabilities, partially offset by a change of $0.4 million in prepaid expenses and other current assets and less than $0.1 million in other assets.

Investing activities

Net cash used in investing activities for the year ended December 31, 2016 was $2.1 million, which was attributable to purchases of property, equipment and software of $1.8 million and acquired intellectual property of $0.3 million.

Financing activities

Net cash used in financing activities for the year ended December 31, 2016 was $12.4 million, which consisted of a distribution to Series A preferred stockholders of $12.4 million, partially offset by less than $0.1 million in proceeds from stock option exercises.

Funding requirements

Our operating expenses have increased substantially in 2017 and 2018 and are expected to increase substantially in the future in connection with our ongoing activities, particularly as we advance our preclinical activities including pre-IND enabling studies, scale-up of manufacturing processes and engagement with CMOs and initiation of human clinical trials. In addition, following the closing of this offering, we expect to incur additional costs associated with operating as a public company.

Specifically, our costs and expenses will increase as we:

- pursue the preclinical and clinical development of our CD19 program as well as product candidates for the treatment of Hepatitis B using ARCUS nucleases under the Gilead Agreement;
- pursue the preclinical and clinical development of other product candidates;
- further scale up our internal manufacturing processes and capabilities and contract with CMOs to support our preclinical studies and clinical trials of our product candidates and make other capital expenditures to support our operations;
- in-license or acquire the rights to other products, product candidates or technologies;
- maintain, expand and protect our intellectual property portfolio;
- hire additional personnel in research, manufacturing and regulatory and clinical development as well as management personnel; and
- expand our operational, financial and management systems and increase personnel, including personnel to support our operations as a public company.

We believe that the anticipated net proceeds from this offering, together with our existing cash and cash equivalents, will enable us to fund our operating expenses and capital expenditure requirements through . We have based these estimates on assumptions that may prove to be imprecise, and we could utilize our available capital resources sooner than we expect.

Because of the numerous risks and uncertainties associated with research, development and commercialization of pharmaceutical and agricultural products, it is difficult to estimate with certainty the amount of our working capital requirements. Our future funding requirements will depend on many factors, including:

- the progress, costs and results of our preclinical development and initial clinical trials for our CD19 program;
- the progress, costs and results of our additional research and preclinical development programs;
- the outcome, timing and cost of meeting regulatory requirements established by the FDA and other comparable foreign regulatory authorities;
- the costs and timing of internal process development and manufacturing scale-up activities and contract with CMOs associated with our CD19 program and other programs we advance through preclinical and clinical development;
- our ability to establish and maintain strategic collaborations, licensing or other agreements and the financial terms of such agreements;
- the scope, progress, results and costs of any product candidates that we may derive from ARCUS or any other product candidates we may develop alone or with collaborators;

- the extent to which we in-license or acquire rights to other products, product candidates or technologies;
- the costs and timing of preparing, filing and prosecuting patent applications, maintaining and protecting our intellectual property rights and defending against any intellectual property-related claims; and
- the costs and timing of future commercialization activities, including product manufacturing, marketing, sales and distribution, for any product candidates for which we or our collaborators obtain marketing approval.

Until such time, if ever, that we can generate product revenue sufficient to achieve profitability, we expect to finance our cash needs through a combination of public or private equity or debt financings, collaboration agreements, other third-party funding, strategic alliances, licensing arrangements and marketing and/or distribution arrangements.

To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through other third-party funding, collaboration agreements, strategic alliances, licensing arrangements or marketing and distribution arrangements, we may have to relinquish valuable rights to our technologies, future revenue streams, product development and research programs or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings when needed, we may be required to delay, limit, reduce or terminate our product development or future commercialization efforts or grant rights to develop and market products or product candidates that we would otherwise prefer to develop and market ourselves.

Contractual obligations and commitments

The following is a summary of our significant contractual obligations as of December 31, 2017:

		Payments due by period			
	Total	Less than 1 year	1—3 years	3-5 years	More than 5 years
(in thousands)					
Operating lease obligation(1)	$6,311	$ 804	$1,955	$1,941	$ 1,611

(1) Represents future minimum lease payments under our operating leases for office and lab space in Durham, North Carolina that expire in July 2024.

On March 29, 2018, we entered into an operating lease agreement for office and lab space in Research Triangle Park, North Carolina. We began occupying the space in May 2018 and the total lease payments will be $3.6 million over the seven-year lease term (see Note 15 to our consolidated financial statements included elsewhere in this prospectus for additional information on this agreement).

On October 2, 2018, we entered into a long-term lease agreement for approximately 17,300 square feet of laboratory space located in Research Triangle Park, North Carolina. The lease term is seven years and two months and lease payments begin nine months after execution of the lease. Total lease payments will be approximately $3.5 million over the lease term. The landlord is required to provide us a maximum allowance of $70.58 per square foot for improvements done on the premises, which will be subject to landlord adjustments as outlined in the lease (see Note 15 to our consolidated financial statements included elsewhere in this prospectus for additional information on this agreement).

We enter into contracts in the normal course of business with CROs, CMOs and other third parties for preclinical research studies, clinical trials and testing and manufacturing services. These contracts do not contain minimum purchase commitments and are cancelable by us upon prior written notice. Payments due upon cancellation consist only of payments for services provided or expenses incurred, including noncancelable obligations of our service providers, up to the date of cancellation. These payments are not included in the table above as the amount and timing of such payments are not known.

On January 1, 2018, we entered into a research, collaboration and license agreement with the University of Pennsylvania, or Penn, that includes three knockout programs and up to three gene knockin or gene repair programs. We will provide funding to Penn and receive a license to certain technology invented under the agreement. The research funding payments will be expensed as incurred.

In addition, we have entered into the Duke License under which we are obligated to make aggregate future milestone payments of up to $0.2 million upon the achievement of specified corporate milestones as well as low-single digit percent royalty payments based on future net sales of applicable products and generally mid-teen percent royalties based on sublicensing revenue. See the section entitled “Business—License and collaboration agreements” appearing elsewhere in this prospectus for more information regarding our payment obligations under the Duke License. We have not included future payments under this agreement in the table above since the payment obligations under this agreement are contingent upon future events, such as the achievement of specified milestones or generating product sales, and we are unable to estimate the timing or likelihood of achieving these milestones or generating future product sales.

Critical accounting policies and use of estimates

Our management’s discussion and analysis of financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of our consolidated financial statements and related disclosures requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities, costs and expenses and the disclosure of contingent assets and liabilities in our consolidated financial statements. We base our estimates on historical experience, known trends and events and various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. We evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are described in more detail in the notes to our consolidated financial statements included elsewhere in this prospectus, we believe that the following accounting policies are those most critical to the judgments and estimates used in the preparation of our consolidated financial statements.

Revenue recognition

Our revenues are generated primarily through collaborative research, license, development and commercialization agreements. The terms of these agreements generally contain multiple elements, or deliverables, which may include (1) licenses, or options to obtain licenses, to use our technology, (2) research and development activities to be performed on behalf of the collaborative partner, and (3) in certain cases, services in connection with the manufacturing of pre-clinical and clinical material. Payments we receive under these arrangements typically include one or more of the following: non-refundable, upfront license fees; option exercise fees; funding of research and/or development efforts; clinical and development, regulatory, and sales milestone payments; and royalties on future product sales. We classify payments received under these agreements as revenues within our consolidated statements of operations.

In February 2016, we entered into the Servier Agreement for research, development, manufacturing of product for clinical trials and commercialization of products using our genome editing technology for the treatment of certain diseases (see Note 13 to our consolidated financial statements included elsewhere in this prospectus). Consideration we received, or may receive, under this collaboration and license agreement includes upfront nonrefundable payments, payments based upon the achievement of certain milestones and royalties on any resulting net product sales.

Revenue is recognized when all of the following conditions are met: (1) persuasive evidence of an arrangement exists, (2) delivery has occurred or services have been rendered, (3) fees are fixed or determinable, and (4) collection of fees is reasonably assured.

We analyze our collaboration arrangements to assess whether they are within the scope of Accounting Standards Codification 808, Collaborative Arrangements, or ASC 808, to determine whether such arrangements involve joint operating activities performed by parties that are both active participants in the activities and exposed to significant risks and rewards dependent on the commercial success of such activities. This requires that we determine whether elements of the collaboration are deemed to be within the scope of ASC 808 and those that are more reflective of a vendor-customer relationship and therefore within the scope of Accounting Standards Codification 605-25, Revenue Recognition—Multiple-Element Arrangements, or ASC 605. To date, we have no arrangements that are within the scope of ASC 808.

When evaluating multiple element arrangements under ASC 605, we determine whether the arrangement should be divided into separate units of accounting and how the arrangement consideration should be measured and allocated among the separate units of accounting. An element qualifies as a separate unit of accounting when the delivered element has standalone value to the customer. Any delivered elements that do not qualify as separate units of accounting are combined with other undelivered elements within the arrangement as a single unit of accounting. If the arrangement constitutes a single combined unit of accounting, we determine the revenue recognition method for the combined unit of accounting and recognize the revenue over the period from inception through the date the last deliverable within the single unit of accounting is delivered. Our arrangements do not include a general right of return relative to delivered elements.

Amounts received prior to satisfying all revenue recognition criteria are recorded as deferred revenue in our accompanying consolidated balance sheets. Our deferred revenue includes nonrefundable upfront license fees. The deferred revenue is recognized into revenue on a proportional or straight-line basis over the estimated period of our substantive performance obligations or the period the rights granted are in effect. Analyzing the arrangement to identify deliverables requires the use of judgment and each deliverable may be an obligation to deliver services, a right or license to use an asset or another performance obligation.

In arrangements that include license rights and other noncontingent deliverables, these deliverables do not have standalone value because the noncontingent deliverables are dependent on the license rights, are not sold separately and cannot be resold. In addition, when noncontingent deliverables are sold with upfront license rights, the license rights do not represent the culmination of a separate earnings process. As such, we account for the license and the noncontingent deliverables as a single combined unit of accounting. In such instances, the license revenue in the form of nonrefundable upfront payments is deferred and recognized over the applicable relationship period, which historically has been the estimated period of our substantive performance obligations or the period the rights granted are in effect.

We will recognize clinical and development, regulatory, and sales milestone payments as revenue when earned if they are substantive and we have no ongoing performance obligations related to the milestone payment. A milestone payment is considered substantive if it (1) is commensurate with either our performance to achieve

the milestone or the enhanced value of the delivered item as a result of a specific outcome from our performance to achieve the milestone, (2) relates solely to past performance, and (3) is reasonable relative to all of the deliverables and payment terms, including other potential milestone consideration, within the arrangement.

Royalties earned on product sales, if any, are recognized based on contractual terms of the agreement when reported sales are reliably measurable and collectibility is reasonably assured, provided that there are no performance obligations then remaining. To date, none of our product candidates have been approved and, therefore, we have not earned any royalty revenue from product sales.

In the event an agreement was to be terminated and we have no further performance obligations at that time, we would recognize as revenue any portion of the non-refundable upfront payment and other payments that had not previously been recorded as revenue and were classified as deferred revenue at the date of such termination.

Accrued research and development expenses

As part of the process of preparing our consolidated financial statements, we are required to estimate our accrued research and development expenses. This process involves reviewing open contracts and purchase orders, communicating with our personnel to identify services that have been performed on our behalf and estimating the level of service performed and the associated costs incurred for the services when we have not yet been invoiced or otherwise notified of the actual costs. The majority of our service providers invoice us in arrears for services performed, on a pre-determined schedule or when contractual milestones are met; however, some require advance payments. We make estimates of our accrued expenses as of each balance sheet date in our consolidated financial statements based on facts and circumstances known to us at that time. Examples of estimated accrued research and development expenses include fees paid to the following:

- CROs and other third parties in connection with performing research and development activities, conducting preclinical studies and clinical trials on our behalf;
- vendors in connection with preclinical development activities; and
- CMOs and other vendors in connection with product manufacturing and development and distribution of preclinical supplies.

We base our expenses related to preclinical studies on our estimates of the services received and efforts expended pursuant to quotes and contracts with CROs that conduct and manage preclinical studies and clinical trials and CMOs that manufacture product for our research and development activities on our behalf. The financial terms of these agreements are subject to negotiation, vary from contract to contract and may result in uneven payment flows. There may be instances in which payments made to our vendors will exceed the level of services provided and result in a prepayment of the expense. In accruing fees, we estimate the time period over which services will be performed and the level of effort to be expended in each period. If the actual timing of the performance of services or the level of effort varies from our estimate, we adjust the accrual or amount of prepaid expense accordingly. Although we do not expect our estimates to be materially different from amounts actually incurred, our understanding of the status and timing of services performed relative to the actual status and timing of services performed may vary and may cause us to report amounts that are too high or too low in any particular period. To date, we have not made any material adjustments to our prior estimates of accrued research and development expenses.

Stock-based compensation

We measure stock options and other stock-based awards granted to our employees, directors, consultants and advisors based on the fair value on the date of the grant and recognize compensation expense for those awards, net of actual forfeitures, over the requisite service period, which is generally the vesting period of the respective award.

For stock-based awards granted to non-employees, compensation expense is recognized over the period during which services are rendered by such non-employees until completed. At the end of each financial reporting period prior to the completion of the service, the fair value of these awards is re-measured using the then-current fair value of our common stock and updated assumption inputs in the Black-Scholes option-pricing model.

We estimate the fair value of each stock option grant on the date of grant using the Black-Scholes option-pricing model, which uses as inputs the fair value of our common stock and assumptions we make for the volatility of our common stock, the expected term of our stock options, the risk-free interest rate for a period that approximates the expected term of our stock options and our expected dividend yield.

Determination of fair value of common stock

As there has been no public market for our common stock to date, the estimated fair value of our common stock has been determined by our board of directors as of the date of each option grant, with input from management, taking into consideration our most recently available third-party valuations of common stock at the time of the grants, as well as our board of directors' assessment of additional objective and subjective factors that it believed were relevant and which may have changed from the date of the most recent valuation through the date of the grant. Third-party valuations, or valuation reports, were performed in accordance with the guidance outlined in the American Institute of Certified Public Accountants' Accounting and Valuation Guide, *Valuation of Privately-Held-Company Equity Securities Issued as Compensation*.

Our common stock valuation reports were prepared using a market approach, utilizing either the guideline M&A or guideline public company methodologies. Under the guideline M&A methodology, a set of mergers and acquisitions within the biotechnology and pharmaceutical industries for similar stage companies were reviewed and an applicable equity value was selected to apply to the company. Under the guideline public company methodology, the market capitalizations of similar public companies were analyzed and an applicable capitalization for the company was selected on the basis of qualitative and quantitative factors.

For each valuation report, an option pricing allocation method, or OPM, was selected to allocate the total equity value across the various securities outstanding at the time of the valuation. The OPM treats common stock and preferred stock as call options on the total equity value of a company, with exercise prices based on the value thresholds at which the allocation among the various holders of a company's securities changes. These third-party valuations resulted in a valuation of our common stock of $0.55 and $0.94 per share as of December 31, 2016 and 2017, respectively.

In addition to considering the results of the valuation reports, our board of directors considered various objective and subjective factors to determine the fair value of our common stock as of each grant date, including:

- the prices at which we sold shares of preferred stock and the superior rights and preferences of the preferred stock relative to our common stock at the time of each grant;
- the progress of our research and development programs, including the status and results of preclinical studies for our product candidates;

- our stage of development and commercialization and our business strategy;
- external market conditions affecting the biopharmaceutical industry and trends within that industry;
- our financial position, including cash on hand, and our historical and forecasted performance and operating results;
- the lack of an active public market for our common stock and our convertible preferred stock;
- the likelihood of achieving a liquidity event, such as an initial public offering, or IPO, or sale of our company in light of prevailing market conditions; and
- the analysis of IPOs and the market performance of similar companies in the biopharmaceutical industry.

The assumptions underlying these valuations represented management's best estimate, which involved inherent uncertainties and the application of management's judgment. As a result, if we had used different assumptions or estimates, the fair value of our common stock and our stock-based compensation expense could have been materially different.

Once a public trading market for our common stock has been established in connection with the closing of this offering, it will no longer be necessary for our board of directors to estimate the fair value of our common stock in connection with our accounting for granted stock options and other such awards we may grant, as the fair value of our common stock will be determined based on the quoted market price of our common stock.

Recent accounting pronouncements not yet adopted

A description of recent accounting pronouncements not yet adopted that may potentially impact our financial position, results of operations or cash flows is disclosed in Note 1 to our consolidated financial statements included elsewhere in this prospectus.

Off-balance sheet arrangements

We did not have during the periods presented, and we do not currently have, any off-balance sheet arrangements, as defined under SEC rules.

Quantitative and qualitative disclosures about market risk

We are exposed to market risks in the ordinary course of our business. These risks primarily include interest rate sensitivities. Our interest-earning assets consist of cash and cash equivalents of $62.8 million, or 86.4% of our total assets at December 31, 2017. Interest income earned on these assets was $0.9 million for the year ended December 31, 2017. Our interest income is sensitive to changes in the general level of interest rates, primarily U.S. interest rates. At December 31, 2017, our cash equivalents consisted of money market funds and repurchase agreements that were collateralized by deposits in the form of government securities and obligations. Such interest-earning instruments carry a degree of interest rate risk; however, historical fluctuations in interest income have not been significant for us. We had no debt outstanding as of December 31, 2017.

Emerging growth company status

We are an "emerging growth company," as defined in the JOBS Act, and we may take advantage of reduced reporting requirements that are otherwise applicable to public companies. Section 107 of the JOBS Act exempts

emerging growth companies from being required to comply with new or revised financial accounting standards until private companies are required to comply with those standards. We have elected to take advantage of the extended transition period for complying with new or revised accounting standards; and as a result of this election, our financial statements may not be comparable to companies that comply with public company effective dates. The JOBS Act also exempts us from having to provide an auditor attestation of internal control over financial reporting under Sarbanes-Oxley Act Section 404(b).

We will remain an “emerging growth company” until the earliest of (1) the last day of the fiscal year in which we have total annual gross revenues of $1.07 billion or more, (2) the last day of the fiscal year following the fifth anniversary of the completion of our IPO, (3) the date on which we have issued more than $1.0 billion in nonconvertible debt during the previous three years or (4) the date on which we are deemed to be a large accelerated filer under the rules of the SEC, which generally is when we have more than $700 million in market value of our stock held by non-affiliates and we have been a public company for at least 12 months and have filed one annual report on Form 10-K.

Business

Overview

We are a leading genome editing company dedicated to improving life. We have developed a groundbreaking proprietary genome editing platform to treat human diseases and create healthy and sustainable food and agricultural solutions: we call this platform “ARCUS.” The versatility and breadth of ARCUS support our ability to develop product platforms in a variety of applications. We are initially focusing on three innovative and high value areas where we believe our technology addresses the limitations of other genome editing technologies: cancer immunotherapy (allogeneic CAR T cells), *in vivo* gene corrections and food and agriculture. We expect to commence a Phase 1/2a clinical trial with our lead gene-edited allogeneic CAR T cell candidate targeting CD19 in the first quarter of 2019. We believe our team, whom we call Precisioneers, has the deepest scientific experience and capabilities of all genome editing companies.

Our genome editing platform—ARCUS

Genome editing is a biotechnology process that removes, inserts or repairs a portion of DNA at a specific location in a cell’s genome. Our proprietary genome editing platform, ARCUS, is a collection of protein engineering methods that were developed specifically to re-program the DNA recognition properties of I-CreI. In nature, I-CreI is an endonuclease found in the genome of algae, *Chlamydomonas reinhardtii*, which evolved for the purpose of carrying out a complex gene insertion edit. I-CreI is responsible for modifying a specific location in the algae’s genome by inserting a gene using a very precise cellular repair mechanism called homology directed repair, or HDR.

We believe I-CreI has a number of attributes that are beneficial for genome editing applications, such as:

- **Specificity**. Complex applications of genome editing technology, especially those involving the human body, require a very high level of endonuclease specificity to limit the likelihood that the endonuclease will recognize and cut any genetic sequence other than its intended target. I-CreI recognizes and cuts a DNA sequence that is 22 base pairs in length through a large number of complex molecular interactions with the bases. I-CreI physically couples the functions of DNA binding with DNA cutting, and acts through a slow catalytic mechanism and low turnover rate, remaining inactive in the absence of its DNA target site.
- **Efficiency**. Most applications of genome editing technology require that a sufficient portion of the targeted cells are edited to achieve the desired result. The activity level of the endonuclease is one factor that can affect how many cells are edited. Given its slow catalytic activity, I-CreI is able to achieve a high level of on-target editing while rarely cutting off-target.
- **Delivery**. Size and structural simplicity affect the ease with which endonucleases can be delivered to cells for editing. I-CreI is very small relative to other genome editing endonucleases. As such, it is compatible with many different delivery mechanisms, and its small size and simple structure facilitate the simultaneous delivery of multiple engineered endonucleases to introduce more than one edit to a cell. Both of these properties significantly broaden the spectrum of potential applications for I-CreI-based genome editing endonucleases.
- **Type of cut**. I-CreI creates four base 3’ overhangs when it cuts its DNA site, which increases the likelihood that the cell will repair the DNA cut through HDR. HDR is a mechanism of DNA repair whereby the cell uses a second DNA molecule with a sequence similar to that of the cut DNA molecule to guide the repair process. Since HDR uses a template of similar genetic information to guide the repair process, it is the more precise mechanism of cellular repair compared to the other mechanism, non-homologous end joining, or NHEJ, which prioritizes speed over accuracy, making it prone to leaving insertions and/or deletions of DNA bases at the

cut site. As such, the DNA cuts created by I-CreI can be exploited to efficiently insert or repair DNA as well as DNA.

- **Programmability**. I-CreI recognizes its DNA target site through a complex network of contacts between the endonuclease and the DNA bases which makes the enzyme very challenging to re-program for new editing applications involving different DNA sequences. This engineering challenge represents a very high barrier to entry and has enabled us to secure a strong intellectual property position and control over what we believe to be a superior genome editing technology.

To apply I-CreI to genome editing in other cells or organisms, we must modify it to recognize and cut a different DNA sequence for each new application we pursue. Since the I-CreI endonuclease evolved to recognize its target sequence in the algae genome with a very high degree of selectivity, it is difficult to re-design it to bind and cut a different DNA sequence. Using the ARCUS process, we create customized endonucleases for particular applications. We call these custom endonucleases “ARCUS nucleases.”

We are able to redirect the ARCUS nucleases to a new location in a genome without compromising its editing abilities. In addition to changing the parts of the enzyme involved in recognizing a target DNA site, we can modify the active site of the enzyme and parts of the enzyme involved in anchoring it to the DNA. These modifications allow us to control how tightly the enzyme binds to DNA or how quickly it cuts, both of which play an important role in determining the efficiency with which the endonuclease cuts its intended target site or any potential off-target sites.

We believe ARCUS nucleases are the smallest and easiest to deliver genome editing endonucleases. Like I-CreI, ARCUS nucleases produce DNA cuts with 3’ overhangs that promote HDR, facilitating gene insertions and gene repairs in addition to gene knockouts. We believe that these attributes will enable us to translate ARCUS into a wide array of products that have the potential to address the limitations of other genome editing technologies and improve life.

We leverage ARCUS to build platforms designed to rapidly generate new products in a given field. We are currently developing products from three such platforms: cancer immunotherapy (allogeneic CAR T cells), *in vivo* gene corrections, and food and agriculture.

Cancer immunotherapy (allogeneic CAR T cells). We believe that we have developed the world’s leading allogeneic gene-edited CAR T cell platform with the potential to overcome certain limitations of autologous CAR T cell therapies and significantly increase patient access to these cutting-edge treatments. The allogeneic approach involves the use of donor-derived cells which can be selected using specific criteria to define “healthy” T cells. We expect the allogeneic approach will lessen the product-to-product variability seen in autologous therapies, which are derived from the patient’s own cells. Additionally, donor-derived cells could be used in any patient, eliminating the “one patient: one product” burden of autologous CAR T cell therapies. We are also initially developing product candidates for well-validated CAR T cell targets. Our most advanced program, PBCAR0191, is an allogeneic CAR T cell therapy targeting the well-validated tumor target CD19 and being developed for Acute Lymphoblastic Leukemia, or ALL, and Non-Hodgkin Lymphoma, or NHL. In February 2016, we entered into an agreement with Les Laboratories Servier, or Servier, pursuant to which we have agreed to develop allogeneic CAR T cell therapies for up to six unique antigen targets selected by Servier, one of which is CAR. An IND for PBCAR0191 was submitted to the U.S. Food and Drug Administration, or the FDA, in October 2018. We have used the qualities of ARCUS to create a one-step cell engineering process for allogeneic CAR T cells that we believe will rapidly yield a consistent cell product at a significantly lower cost than autologous CAR T cell therapies. Due to our one-step editing method and the decision early in the development of the platform to invest in process development, our manufacturing process today is scaled as opposed to scalable.

***In vivo* gene corrections.** Our goal is to cure genetic diseases by correcting the DNA errors responsible for causing them. We are advancing a deep portfolio of diverse programs toward *in vivo* efficacy and toxicity studies. We are generating a significant large animal dataset that we believe will be the most comprehensive of any in the field. The potential of ARCUS for *in vivo* genome editing is highlighted in our July 2018 publication in *Nature Biotechnology*, which we believe is the first peer-reviewed publication of *in vivo* genome editing data in non-human primates. The publication reported high-efficiency editing of the PCSK9 gene in non-human primates using ARCUS and, even at the highest dose, the treatment was observed to be well tolerated. Because this therapeutic effect is due to modifications to the DNA itself, the benefit of the treatment appears to be permanent. In September 2018, we announced a collaboration with Gilead Sciences Inc. to co-develop an ARCUS-based cure for chronic Hepatitis B infection.

Food and agriculture. This platform, which we operate through our wholly owned subsidiary, Elo Life Systems, or Elo, is an integrated suite of gene discovery and plant engineering technologies that allows us to generate pre-breeding material for food producers. We believe we have the most in-depth experience in crop genome editing in the industry. Over the last decade, we have developed highly efficient methods to improve delivery and functionality of ARCUS nucleases to edit DNA in plants. By combining the power of our ARCUS technology platform with target discovery, transformation and high throughput evaluation, we are enabling our partners to address emerging opportunities in food and agriculture. Our differentiated collaboration-based business model enables us to remain capital efficient throughout the product-development cycle while generating revenue through various revenue-sharing models. Since 2014, Elo and Cargill have been engaged in a collaboration to produce ARCUS-optimized canola varieties and have achieved significantly lower levels (less than 4.5%) of saturated fatty acids compared to the current levels (7%). These edited varieties are currently being evaluated in greenhouse and field trials.

Our team

We believe that our team, whom we call Precisioneers, has the deepest scientific experience and capabilities of all genome editing companies. Derek Jantz, Ph.D., our Chief Scientific Officer and a co-founder of Precision, and Jeff Smith, Ph.D., our Chief Technology Officer and also a co-founder of Precision, have been working with genome editing technology for more than 15 years. They are pioneers in the genome editing field and developed our ARCUS genome editing platform to address what they perceived as limitations in the existing genome editing technologies. Our Chief Executive Officer, Matthew Kane, also a co-founder of Precision, has almost 20 years' experience in life sciences, most of which has been working in genome editing.

We have selectively expanded our team of Precisioneers to include individuals with extensive industry experience and expertise in the discovery, development, manufacture and commercialization of cell and gene therapies and the creation of innovative solutions to myriad problems affecting food systems. Over half of our team of Precisioneers have advanced degrees, including 42 with Ph.D. degrees.

We are a purpose driven organization, and we have carefully promoted a culture that values innovation, accountability, respect, adaptability and perseverance. We strive to ensure that our open, collaborative culture empowers Precisioneers to be their best selves and do their best work. We strongly believe that our shared values will help our team navigate and overcome any challenges we may experience as we pursue our mission of improving life through genome editing. Our culture has helped build a world-class team with industry-leading experience in genome editing and continually attracts new talent to further build our capabilities. Our team is a group of motivated individuals that value the opportunity to contribute their time and talents toward the pursuit of improving life. Precisioneers appreciate high-quality research and are moved by the opportunity to translate their work into treatments and solutions that will impact human health.

Our strategy

We are dedicated to improving life. Our goal is to broadly translate the potential of genome editing into permanent genetic solutions for significant unmet needs. Our strategy to achieve this goal includes the following key elements:

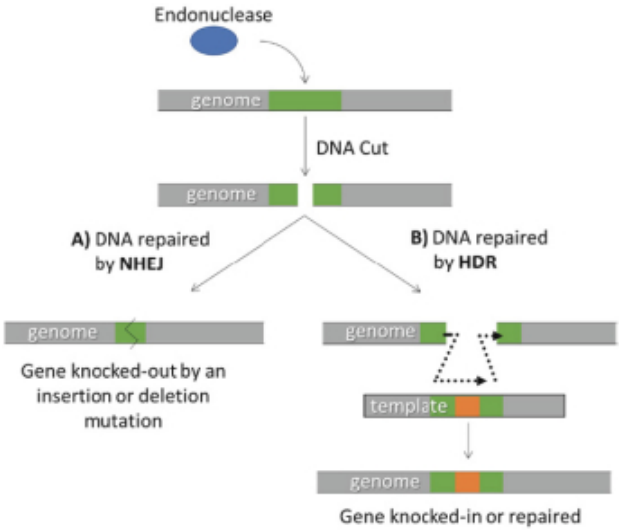
- **Create a fully integrated genome editing company capable of delivering solutions that address unmet needs in human health.** We believe that, to be a leader in the field of genome editing and maximize the impact of our ARCUS genome editing platform, we must be able to control those elements of our business that may provide us with certain strategic advantages or operational efficiencies. We intend to continue to invest in comprehensive research, development and commercial capabilities that provide control and oversight of our product candidates from discovery through commercialization.
- **Accelerate advancement of our first four cancer immunotherapy product candidates.** We believe that we have developed the world's leading allogeneic CAR T cell manufacturing platform and the first that is capable, today, of producing drug product at scale. We have selected four validated CAR T cell targets that we believe offer the greatest chance of clinical success for our initial product candidates, which we intend to rapidly advance into clinical development. In October 2018, we submitted an IND to the FDA for our leading CAR T cell product candidate targeting CD19.
- **Advance *in vivo* genetic correction programs for the liver and eye.** We have achieved high-efficiency and tolerability in *in vivo* genome editing in a non-human primate, as published in *Nature Biotechnology* in July 2018. To our knowledge, we are the first company to complete this milestone, which we believe to be critical to successful *in vivo* genome editing therapeutic development. We intend to build on this early success by diligently advancing a diverse portfolio of preclinical *in vivo* gene correction programs through additional large animal studies, focusing initially on gene targets occurring in the liver and eye. Based on the results from these large animal studies, we intend to advance a subset of these programs to human clinical trials.
- **Build a human health focused food business.** We believe that rapidly changing consumer preferences and food insecurity resulting from population growth and climate change will drive significant demand for genome-edited food products. We are building a fully integrated discovery and development platform that combines genome editing, gene discovery, plant transformation and high-throughput testing to enable accelerated innovation in the food industry. We employ a business model that is focused on collaborating with critical stakeholders within the supply chain from the outset of any given project. We believe that this approach will enable us to successfully respond to growing unmet needs within food supply to build a human health focused business in a capital-efficient manner.
- **Continue investing in the optimization of ARCUS and enabling technologies.** We believe that a key to our future success is the quality of the genome editing tools that we produce. Since our founding, we have devoted ourselves to continuously refining the precision and efficiency of our core genome editing platform. We intend to continue this investment in ARCUS while surrounding it with enabling technologies and expertise to retain what we believe is a leadership position in the field.
- **Create an environment that is a destination of choice for premier talent within the life science industry.** We believe that we currently have the deepest and strongest skill set within the genome editing industry and credit much of our past success to our commitment to our team and culture. Our future success will depend on our ability to continue to attract and retain world-class talent within our markets of interest. We intend to consciously invest in fostering an environment within our company that is both challenging and supportive and inspires our team to broadly translate genome editing into permanent genetic solutions.
- **Expand the breadth of our operations through additional product platforms and strategic relationships.** We believe that the ARCUS genome editing platform has broad utility beyond our current

areas of focus. We intend to invest in the development of additional product platforms and seek collaborations with companies with expertise in areas outside of our current target markets to maximize the value of our company.

Overview of genome editing

Deoxyribonucleic acid, or DNA, carries the genetic instructions for all basic functions of a living cell. These instructions are encoded in four different molecules, called bases, which are strung together in specific sequences to form genes. Each gene is responsible for a specific function in a cell, and the complete set of genes in a cell, which can consist of tens of thousands of genes and billions of individual bases, is known as a genome. The complete genome sequence has been determined for many organisms, including humans. This allows scientists to identify specific genes and determine how their unique sequences contribute to a particular cellular function. Studying variations in gene sequences further informs an understanding of why a cell behaves a certain way, which can greatly enhance understanding of what causes and how to treat aberrant behavior that leads to disease.

Genome editing is a biotechnology process that removes, inserts or repairs a portion of DNA at a specific location in a cell's genome. Early applications of genome editing focused on advancing genetic research. As genome editing technologies have advanced, their application is moving beyond understanding disease to treating or preventing disease by editing DNA. Genome editing is accomplished by delivering a DNA cutting enzyme, called an endonuclease, to a targeted segment of genetic code. Once the endonuclease cuts the DNA, the cell has to repair the break to survive and will do so in one of two ways, as shown below.



There are two mechanisms of DNA repair, non-homologous end joining, or NHEJ, and homology directed repair, or HDR. As shown in A) above, NHEJ is a pathway that repairs breaks in DNA without a template. NHEJ is the less precise method of repair that prioritizes speed over accuracy, making it prone to leaving insertions and/or deletions of DNA bases at the cut site. These insertions or deletions can disrupt the gene sequence and can be used to inactivate or "knock out" the function of the gene. Accordingly, genome editing technologies can be used to permanently knock out a gene in a cell or organism by creating a break in the DNA sequence of that gene.

As shown in B) above, HDR is a mechanism of DNA repair whereby the cell uses a second DNA molecule with a sequence similar to that of the cut DNA molecule to guide the repair process. Since HDR uses a “template” of similar genetic information to guide the repair process, it is the more precise mechanism of cellular repair. HDR results in the sequence of the template being copied permanently into the genome at the site of the DNA cut. If we provide a template DNA molecule directly to the edited cell and the cell repairs itself using HDR, a new gene can be incorporated or “knocked in” at a precise location in the genome. Alternatively, the use of HDR can “repair” a DNA mutation by correcting it to the proper functioning sequence when repairing the break. Thus, genome editing endonucleases can be used to introduce a variety of different changes to the genetic code of a cell or organism including gene knockout, gene insertion and gene repair.

There are several genome editing technologies, including ARCUS, zinc-finger nucleases, or ZFNs, TAL-effector nucleases, or TALENs, and CRISPR/Cas9. These technologies differ from one another principally in the properties of the endonuclease that they each employ. The different endonucleases have fundamentally different mechanisms of recognizing and cutting their DNA targets, which gives each technology advantages and disadvantages depending on how each is used.

Important attributes to consider in evaluating the suitability of a genome editing technology for a particular application include the following:

- **Specificity.** The overall objective of genome editing is to cut and modify a *single site* in a genome with little or no editing at off-target locations. In the three billion base pairs human genome, any DNA sequence greater than 16 base pairs in length is statistically expected to occur only once. Thus, an endonuclease that can specifically identify a DNA sequence of at least 16 base pairs should be able to “find” and cut a single site in the genome. All of the different genome editing endonucleases can recognize target sites of at least this length. However, the ability to discriminate between closely related DNA sequences can vary from one technology to another and also among different endonucleases used in the same technology platform. Less specific endonucleases are prone to introducing off-target edits because the endonuclease may recognize and cut DNA sites that differ from the intended DNA sequence. Off-target editing can alter cell function in unintended ways that can lead to undesirable side effects. In applications of genome editing technology where safety is a concern, high endonuclease specificity is a critical attribute.
- **Efficiency.** Genome editing typically involves large numbers of cells growing in isolation or in a tissue or organism. Each cell in the population that is exposed to the editing endonuclease may or may not become edited and, among the edited cells, the genetic changes can vary from cell to cell. For most applications, a low frequency of “properly” edited cells is not sufficient to achieve the desired outcome. Thus, a critical attribute of a genome editing endonuclease is its ability to cut its intended DNA site efficiently to ensure that a sufficient number of cells in the population are edited. Factors that contribute to editing efficiency include the activity level of the endonuclease, the accessibility of the DNA target site in the genome and the amount of endonuclease delivered to the cell.
- **Delivery.** Before a genome editing process begins, the endonuclease must be delivered to the cell to be edited. Endonucleases can be delivered in a variety of different forms depending on the intended application. Most frequently, genome editing endonucleases are delivered to a cell in the form of a genetic construct, either DNA or mRNA (messenger ribonucleic acid), that is translated into the endonuclease by the cell’s natural genetic translation mechanisms. The DNA or mRNA can be delivered to the cell using several different strategies depending on the application. For *ex vivo* applications involving the editing of isolated cells outside of the organism, DNA or mRNA encoding the editing endonuclease is typically delivered using chemical, electrical or virus-based approaches. For *in vivo* applications involving the editing of cells inside a living organism, delivery options are typically more limited and virus-based approaches predominate. In general, the difficulty of delivering an endonuclease to cells depends on its size and number of components. Large

and/or multi-component endonucleases are more challenging to deliver and compatible with fewer delivery strategies whereas endonucleases that are smaller and/or a single component can generally be more broadly applied.

- **Type of cut.** The type of cut made by an endonuclease can influence the repair mechanism employed by the edited cell, which in turn impacts the type of gene edits that can be accomplished. DNA consists of two parallel strands of bases. Genome editing endonucleases typically cut both strands to initiate a genome editing event. However, the type of double-strand cut made differs among endonucleases. Some endonucleases create “blunt” ends in which both strands of the DNA are cut in the exact same location. Other endonucleases create staggered cuts in which one strand overhangs the other. This results in the formation of a short stretch of single-stranded DNA bases. If the top strand overhangs the bottom strand, it is referred to as a 3’ overhang. Conversely, if the bottom strand overhangs the top, it is referred to as a 5’ overhang. Since the first step in the HDR process requires a 3’ single strand of DNA, cells are more likely to repair cuts that leave 3’ overhangs using HDR. Cellular repair using HDR facilitates more complex genetic edits, such as gene addition or gene repair. Accordingly, the type of cut made by the genome editing technology impacts its potential applications.
- **Programmability.** To actively target and cut a certain portion of a genome, endonucleases must be programmable with respect to DNA sequence specificity. Each genome editing application requires a custom-made endonuclease that recognizes and cuts DNA at a particular location of interest. Thus, it is necessary to engineer the endonuclease to recognize a new DNA target site for each new application. The extent to which an endonuclease can be engineered to recognize new DNA sequences and the difficulty of accomplishing such engineering are properties that differ among genome editing technologies. A primary driver of genome editing technology development over the last two decades has been increasing the ease of programmability of the endonucleases to increase the accessibility of the technology.

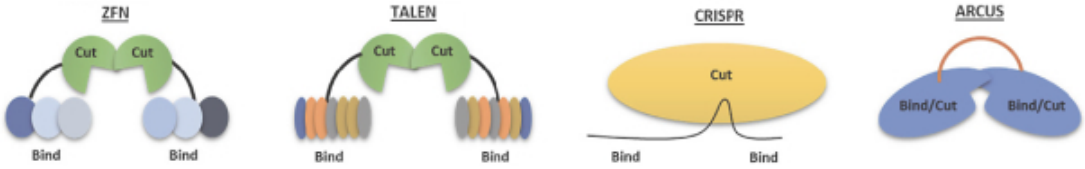
Our approach to genome editing

We are pioneers in the field of genome editing and have extensive experience with a breadth of genome editing technologies. Our Precision platform was developed to address limitations of other editing technologies that could impair their deployment for therapeutic applications. We looked to nature for examples of genome editing and found the I-CreI endonuclease from the algae *Chlamydomonas reinhardtii*. Unlike ZFN, TALEN or CRISPR/Cas9, I-CreI is a natural enzyme that evolved to edit a large, complex genome. In nature, it is responsible for modifying a specific location in the algae genome by inserting a gene using the HDR process.

We believe that I-CreI has a number of attributes that make it attractive for the development of novel genome editing endonucleases, such as:

- **Specificity.** Complex applications of genome editing technology, especially those involving the human body, require a very high level of endonuclease specificity to limit the likelihood that the endonuclease will recognize and cut any genetic sequence other than its intended target. We believe that several attributes of I-CreI naturally inhibit off-target cutting. I-CreI:
  - Recognizes and cuts a DNA sequence that is 22 base pairs in length. A sequence of this length is statistically expected to occur only once in a large genome.
  - Recognizes its DNA target site through a large number of complex molecular interactions with the bases. Relative to other endonucleases, an unusually high percentage of the I-CreI protein surface area is dedicated to specific contacts with the DNA bases. This method of site recognition enhances I-CreI’s ability to discriminate among similar sequences of DNA, reducing the likelihood that it will cut DNA sequences that differ even slightly from the intended DNA sequence.

- Physically couples the functions of DNA binding and DNA cutting. The region of I-CreI that is responsible for DNA site recognition also contains the region that cuts the DNA, or the active site. Due to this structure, the active site is not in a position to cut unless the enzyme is seated properly on the correct DNA sequence. ZFN, TALEN and CRISPR/Cas9 are multi-domain endonucleases in which the DNA-binding and DNA-cutting functions reside in different regions of the enzyme.



- Remains inactive in the absence of its DNA target site. When I-CreI is not bound to its proper DNA target site, it folds up on itself such that its active site is blocked from external interaction. In this form, I-CreI is inert. This structural configuration provides a type of natural "on/off switch" that reduces I-CreI's activity away from the target site. Other genome editing endonucleases lack this type of natural control over the enzyme's cutting activity.
- Cuts slowly and with low turnover. Relative to other genome editing endonucleases and to enzymes in general, I-CreI has a very slow mechanism of action. I-CreI takes a relatively long time to cut its DNA target site and, after doing so, remains bound to the cut DNA ends. These properties greatly reduce the likelihood that I-CreI will cut any other DNA site after making its initial on-target cut. We believe that this translates directly to a reduction in the frequency of off-target cutting without sacrificing on-target editing efficiency. In contrast, other editing endonucleases have very high rates of catalysis and turnover because their natural function is defending bacteria from viruses.

- **Efficiency.** Most applications of genome editing technology require that a sufficient portion of the targeted cells are edited to achieve the desired result. The activity level of the endonuclease is one factor that can affect how many cells are edited. The slow catalytic mechanism of I-CreI imparts specificity but does not impact its on-target efficiency for genome editing purposes because genome editing involves cutting only a single site in a cell. As such, I-CreI is able to achieve a high level of on-target editing while rarely cutting off-target.
- **Delivery.** Size and structural simplicity affect the ease with which endonucleases can be delivered to cells for editing. I-CreI is very small relative to other genome editing endonucleases. It is approximately one quarter to one sixth of the size of the ZFN, TALEN and CRISPR/Cas9 endonucleases. Unlike those endonucleases, I-CreI can be delivered as a single gene. As such, it is compatible with many different delivery mechanisms. Additionally, I-CreI's size and structure facilitate the simultaneous delivery of multiple engineered endonucleases to introduce more than one edit to a cell. Both of these properties significantly broaden the spectrum of potential applications for I-CreI-based genome editing endonucleases.
- **Type of cut.** A genome editing technology that facilitates cellular repair through HDR enables applications that require a gene insertion or gene repair. Unlike other editing endonucleases, I-CreI creates four base 3' overhangs when it cuts its DNA site, which increases the likelihood that the cell will repair the DNA cut through HDR. As such, the DNA cuts created by I-CreI can be exploited to efficiently insert or repair DNA, consistent with the natural role of I-CreI in catalyzing the targeted insertion of a gene in algae.
- **Programmability.** As described above, I-CreI recognizes its DNA target site through a complex network of contacts between the endonuclease and the DNA bases. While this confers significant specificity advantages, it also makes the enzyme very challenging to re-program for new editing applications involving different DNA

sequences. Indeed, the challenges associated with re-programming I-CreI have, historically, hampered its adoption by the genome editing community in favor of more easily engineered endonucleases. This engineering challenge represents a very high barrier to entry and has enabled us to secure a strong intellectual property position and control over what we believe to be a superior genome editing technology.

Other than the key programming challenge, we believed that the differentiated properties of I-CreI cited above made it an ideal “scaffold” for the development of novel genome editing tools. Moreover, we believed those properties were differentiated enough from other editing technologies to merit substantial investment in overcoming the key challenge of programmability. To that end, we invested 15 years of research effort to develop a robust, proprietary protein engineering method that now enables us to consistently re-program I-CreI to direct it to targeted sites in a genome. We call our approach “ARCUS.”

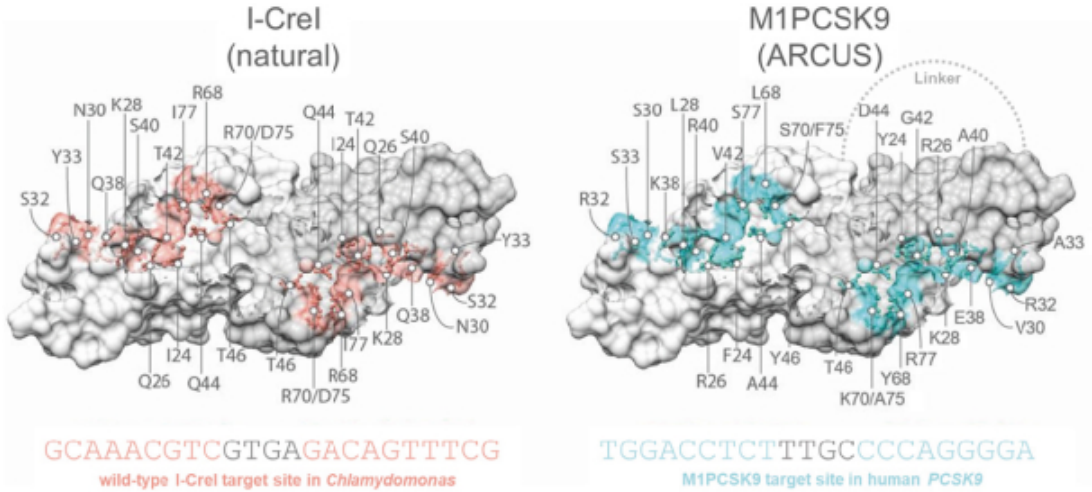
Our ARCUS genome editing platform

ARCUS is a collection of protein engineering methods that we developed specifically to re-program the DNA recognition properties of I-CreI. The natural I-CreI endonuclease recognizes and cuts a DNA sequence in the genome of algae. To apply I-CreI to genome editing in other cells or organisms, we must modify it to recognize and cut a different DNA sequence for each new application we pursue. Since the I-CreI endonuclease evolved to recognize its target sequence in the algae genome with a very high degree of selectivity, it is difficult to re-design it to bind and cut a different DNA sequence. Using the ARCUS process, we create customized endonucleases for particular applications. We call these custom endonucleases “ARCUS nucleases.” Our process is proprietary and core components are claimed in an extensive international patent portfolio. Moreover, since the ARCUS process involves a sophisticated blend of protein engineering art and science, each ARCUS nuclease we create is novel and, we believe, patentable.

The ARCUS process involves a combination of computer-based, or *in silico*, protein modeling and an experimental method called directed evolution that allows us to change a substantial portion of the amino acid building blocks in the I-CreI endonuclease. We use this process to re-direct the endonuclease to a new location in the genome without compromising its editing abilities. In addition to changing the parts of the enzyme involved in recognizing a target DNA site, we can modify the active site of the enzyme and parts of the enzyme involved in anchoring it to the DNA. These modifications allow us to control how tightly the enzyme binds to DNA and how quickly it cuts, both of which play an important role in determining the efficiency with which the endonuclease cuts its intended target site or any potential off-target sites.

The natural I-CreI target site is pseudo-palindromic, meaning the first half of the sequence is approximately a mirror image of the second half of the sequence. Palindromic DNA sites are rare in most genomes so it was necessary for us to develop additional technology that would overcome this limitation on the diversity of DNA sites that we can target. To this end, the ARCUS process involves the production of *two* re-programmed I-CreI proteins for each target site. These two different proteins are then linked together into a single protein that can be expressed from a single gene. This approach, called a “single-chain endonuclease,” represents a major advancement in I-CreI engineering because it enables our ARCUS nucleases to recognize and cut *non*-palindromic target sites using an endonuclease that, like natural I-CreI, is very small and easy to deliver to cells.

The graphic below depicts the molecular structure of natural I-CreI in comparison to an engineered ARCUS nuclease called “M1PCSK9.” The regions of the structures colored in pink or cyan represent the amino acid building blocks that are responsible for contacting the DNA target site and determining the sequence of DNA bases that the endonuclease recognizes and cuts. The DNA target sites recognized by the two endonucleases are shown below the structures.



Since creating an ARCUS nuclease requires such extensive reengineering of I-CreI, it is, generally, an iterative process that involves multiple cycles of design and testing. We can typically produce a first-generation ARCUS nuclease in seven weeks. First-generation nucleases are suitable for research and development, proof-of-concept studies or other non-therapeutic applications. For therapeutic applications requiring the lowest possible off-targeting, however, we are rarely satisfied with generation one and each endonuclease undergoes extensive optimization. To this end, we thoroughly interrogate the nuclease with respect to its on- and off-target cutting properties using ultra-sensitive tests that we developed specifically for use with ARCUS. These results then inform our design of a second-generation nuclease with the goal of optimizing on-target efficiency while minimizing off-target cutting. Therapeutic ARCUS nucleases typically require two to four cycles of design and testing, often resulting in off-target cutting frequencies that are below the limit of detection with our most sensitive assays. This process can take six months or longer and has resulted in development of “therapeutic-grade” editing endonucleases.

The ARCUS process is robust and reproducible. It enables us to create engineered variants of the I-CreI endonuclease that recognize and cut DNA sites that bear little resemblance to I-CreI’s natural target site. Importantly, however, ARCUS retains the attributes of I-CreI that we believe make it highly suitable as a genome editing endonuclease for complex commercial applications. We believe that ARCUS nucleases are exquisitely specific as a result of the natural structure of I-CreI and the intricate design process we employ to create them. To our knowledge, ARCUS nucleases are the smallest and easiest to deliver genome editing endonucleases. Like I-CreI, ARCUS nucleases produce DNA cuts with 3’ overhangs that promote HDR, facilitating gene insertions and gene repairs in addition to gene knockouts. We believe that these attributes will enable us to translate ARCUS into a wide array of products that have the potential to address the limitations of other genome editing technologies and improve life.

Our product development platform approach

We believe that ARCUS is a leading genome editing platform for therapeutic, food and agricultural applications. Realizing the potential of ARCUS, however, requires supporting technologies and capabilities. To facilitate the potential commercial deployment of ARCUS in different fields, we surround it with ancillary technologies, domain expertise and infrastructure specific to that area of development. We leverage ARCUS to build platforms designed to rapidly generate new products in a given field. We are currently developing products from three such platforms:

- **Cancer immunotherapy (allogeneic CAR T cells).** Our most advanced product platform is constructed for the large-scale production of allogeneic CAR T cells for cancer immunotherapy. Our lead therapeutic product candidate, PBCAR0191, is a gene-edited anti-CD19 CAR T cell therapy for the treatment of Acute Lymphocytic Leukemia, or ALL, and Non-Hodgkin Lymphoma, or NHL, for which we submitted an IND to the FDA in October 2018. We are also developing product candidates in this platform against other validated targets, including CD20, b-cell maturation antigen, or BCMA, and CLL-1.
- ***In vivo* gene correction.** We believe that ARCUS can be used to treat genetic disorders by directly correcting the causative defect in a patient's DNA. This approach, long considered the "Holy Grail" of the genome editing field, requires exquisite levels of editing specificity and the ability to deliver editing endonucleases efficiently to different tissues in the body. As such, we believe that ARCUS is well-positioned to lead this emerging field of genetic medicine. We have several programs targeting the eye and liver and have already achieved *in vivo* proof-of-concept in large animals, including a non-human primate model for a program targeting the liver. We intend to advance certain of these programs into preclinical development with the goal of submitting an IND to the FDA for our lead *in vivo* gene correction product candidate in 2020.
- **Food and agriculture.** Our third product platform is built for the creation of novel products that enhance the nutrition and diversity of the food supply. This platform, which we operate through our wholly owned subsidiary, Elo Life Systems, or Elo, is an integrated suite of gene discovery and plant engineering technologies that allows us to generate pre-breeding material for food producers. Unlike conventional plant biotechnology companies who focus on traits that are valued by the farmer, Elo is focused on a rapidly emerging trend in Western consumers toward healthier eating. Elo partners directly with food companies to develop healthier ingredients through highly focused genetic optimization. These ingredients, in turn, should translate to healthier food products and improved world nutrition.

Our cancer immunotherapy (allogeneic CAR T cells) platform

We are leveraging the properties of ARCUS in an integrated platform for the development and large-scale production of CAR T cell immunotherapies. A key to the success of this platform is a proprietary, one-step method for modifying the genetics of T cells from a healthy donor to make them detect and kill cancer cells. This method allows us to manufacture CAR T cell product candidates rapidly, at large scale and with greater consistency than currently marketed CAR T cell therapies. As such, we believe that our allogeneic CAR T cell platform will greatly increase patient access to these cutting-edge treatments.

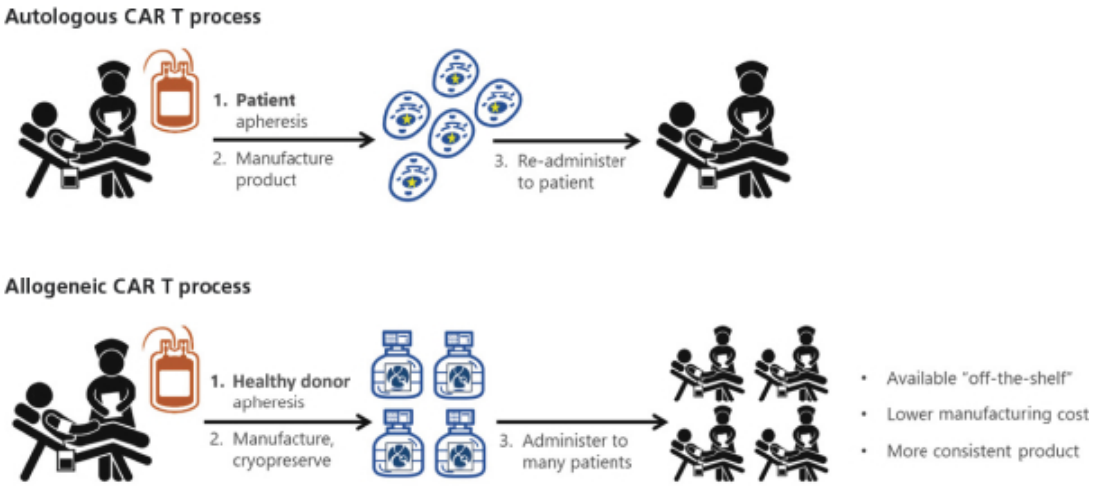
CAR T cell therapies

CAR T cell therapy is a form of cancer immunotherapy that uses a patient's immune system to kill cancer cells. T cells are a component of the immune system that can distinguish pathogen-infected or tumor cells from healthy cells and kill them. Recognition of pathogen-infected cells or tumor cells occurs through a protein called a T cell receptor, or TCR, that is expressed on the surface of T cells. Tumor cells, however, have evolved numerous ways to evade TCR-mediated killing by T cells. In CAR T cell therapy, T cells are engineered *ex vivo* to express a protein called a chimeric antigen receptor, or CAR, that recognizes specific tumor cells and allows the T cells to function independently of the TCR, thus circumventing tumor cells' evasion of the TCR. CAR T cell therapy has been shown in clinical trials to be an effective treatment for patients that have not responded to traditional cancer treatments, and there are now two FDA approved CAR T cell products available to treat certain types of leukemia and lymphoma.

The most common form of CAR T cell therapy, which includes the two approved therapies, is referred to as "autologous" CAR T cell therapy because the CAR T cells are generated using T cells taken directly from the cancer patient. T cells are harvested from the patient, genetically engineered *ex vivo* to express a CAR, and then injected back into the patient. While autologous CAR T cell therapy has been shown to be effective for treating certain tumor types, it has several significant drawbacks:

- **Patient eligibility.** Many patients may not be eligible for the treatment because of low T cell numbers and poor T cell quality or because the risk of undergoing the process to harvest T cells is too great.
- **Consistency.** Since each autologous therapy is, by definition, unique, it is difficult to define standards of safety and efficacy or to thoroughly assess the quality of the product prior to infusion into the patient.
- **Delay in treatment.** Because the process to make CAR T cells can take several weeks, there is a significant delay in treating what can often be very aggressive tumors. If manufacturing complications such as contamination, mislabeling or low yield are encountered, the patient may not survive long enough to attempt manufacturing a second time.
- **Cost.** The CAR T cell manufacturing process is complex and expensive. In the case of an autologous therapy, the process must be performed, in its entirety, for each patient. As such, scaling of the manufacturing process is exceedingly difficult, and the cost of product manufacturing has resulted in high treatment costs per patient. This high cost of treatment, along with the practical complexities described above, limits the availability of autologous CAR T cell therapies to patients.

We believe that the use of allogeneic, or donor-derived, CAR T cells will address many of the challenges associated with autologous CAR T cell therapy. An allogeneic approach allows selection of donors using specific criteria to define “healthy” T cells, which we expect will lessen the product-to-product variability seen in autologous therapies. Donor-derived cells could be used in any patient, eliminating the “one patient: one product” burden of autologous CAR T cell therapies. Because healthy donors would provide the starting material, patients that were too sick or otherwise unqualified for an autologous approach may benefit from an allogeneic CAR T cell therapy. Additionally, patients receiving an off-the-shelf allogeneic treatment would not have to wait for the manufacture of a personalized autologous treatment, which could be further delayed by manufacturing difficulties. By scaling the manufacturing of CAR T cells and optimizing the manufacturing process for a specific pool of donors, we believe that allogeneic CAR T cells can be manufactured at costs that are significantly lower than autologous CAR T cells and that will, over time, approach the manufacturing costs for conventional biologic drugs. These potential advantages of an allogeneic approach should allow for a safer, more predictable product with defined quality standards and significantly increase patient access.



The major challenge to producing allogeneic CAR T cells is that donor-derived T cells still express their own TCR. Because the TCR enables T cells to recognize cells that are foreign to the donor, they may induce graft versus host disease, or GvHD, if introduced to the patient in their natural form. This is a dangerous condition in which the donor T cells indiscriminately attack cells in the body of the patient. Accordingly, expression of the TCR must be eliminated in donor cells before the cells can be engineered into CAR T cells and administered to a patient. An allogeneic CAR T cell therapy therefore requires the use of a genome editing technology like ARCUS to knock out TCR genes in the DNA to produce “universal” donor cells that are designed to be incapable of eliciting GvHD.

We and others have shown that genome editing can be used to eliminate expression of the TCR on donor cells, and there are several companies working on gene-edited allogeneic CAR T cell therapies. However, there are a number of challenges associated with manufacturing gene-edited allogeneic CAR T cells, including the following:

- **T cell phenotype.** T cells actually comprise several subtypes of different cells. Some subtypes of T cells are directly responsible for killing virus-infected or tumor cells, while other subtypes serve a helper function. Some subsets retain a “memory” function and can be recalled later if the target tumor reappears, and some subsets even decrease the killing activity of T cells. These subsets are distinguished by the unique combination of proteins they express on their cell surface, which is described as their “phenotype.”

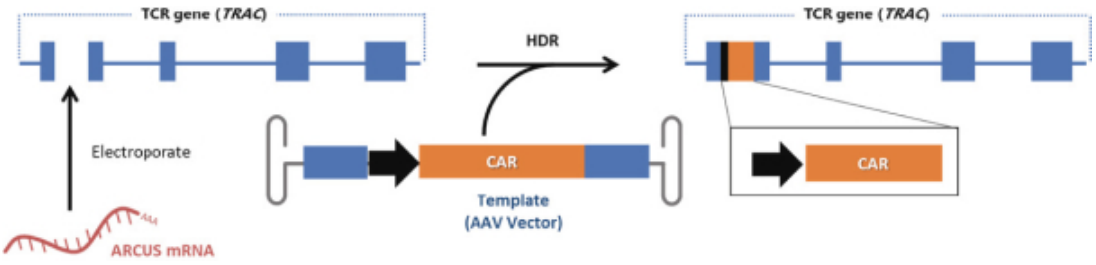
Understanding what phenotypes of T cells are best for a CAR T cell therapy is important, as is the ability to maintain the stability of those phenotypes throughout the manufacturing process. Depending on growth conditions, phenotypes of T cells may change over the course of a manufacturing run, and the final product may not be the desired mix of T cell subtypes.

- **Consistency.** In most CAR T cell therapies, the CAR is introduced into the T cell using a viral vector, usually a lentiviral vector. Lentiviral vectors are vectors derived from the HIV-1 virus, which is a member of the viral subfamily of the lentivirus. This lentiviral vector inserts the CAR randomly or semi-randomly into the T cell genome. When introduced in this manner, CAR expression typically varies significantly from cell-to-cell depending on the number of CARs that were delivered and where in the T cell genome they were inserted. This variability can cause CAR T cells to be inconsistent from cell-to-cell within the same CAR T cell batch. Too little expression could make the CAR T cell unable to activate and kill when it identifies a cancer cell. Too much expression could lead the CAR T cell to become hyper-stimulated, which can lead to an inactive state known as “exhaustion.”
- **Scalability.** Manufacturing scale drives the cost and availability of the final “off-the-shelf” product. If an allogeneic CAR T cell therapy cannot be manufactured at large scale, it has few advantages over an autologous therapy. While generating allogeneic CAR T cells at lab scale (a few million cells) is straightforward, manufacturing them at a clinically relevant scale (billions of cells) is a major challenge that is impacted by, among other things, the efficiency of CAR gene insertion, the efficiency of on- and off-target genome editing, starting donor T cell phenotype and the duration of the manufacturing process.

Our approach to allogeneic CAR T cells

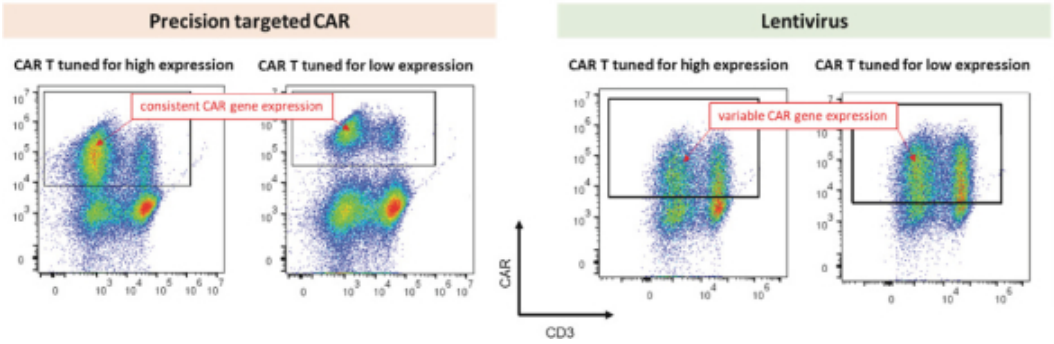
We have used the qualities of ARCUS to create a one-step cell engineering process for allogeneic CAR T cells that we believe will yield a well-defined cell product in a cost-effective manner. To produce an allogeneic CAR T cell, it is necessary to make two edits to the DNA of T cells from a healthy donor. First, it is necessary to knock out the gene that encodes the TCR to prevent the donor-derived T cells from eliciting GvHD in the patient. The TCR is actually a complex of several different components encoded by different genes, and knocking out any one of them is generally sufficient to prevent the TCR from functioning. Second, it is necessary to add, or knock in, a gene that encodes the CAR to give the T cells the ability to recognize and kill cancer cells. Precision developed a proprietary, one-step method for achieving both genetic changes simultaneously. This method, aspects of which are protected by seven issued U.S. patents, involves the use of ARCUS to target the insertion of a CAR gene directly into the gene that encodes the alpha subunit of the TCR. This approach adds the DNA encoding the CAR while simultaneously disrupting the DNA encoding the TCR, essentially replacing one gene with the other.

One-step engineered allogeneic CAR T cells



We believe that our one-step engineering approach, and the differentiated attributes of the ARCUS nucleases used to implement it, will overcome many of the critical challenges associated with allogeneic CAR T cell production as follows:

- **T cell phenotype.** Because it is well established that T cell phenotype has a profound impact on the efficacy of CAR T cell therapy, we have established a T cell platform that is designed to maximize the percentage of cells with ideal phenotypes. Our process starts with carefully screening donors to identify individuals with high percentages of "young" (naïve or central memory) T cells that should yield the most potent cell product. To this end, we have developed our own set of analytics for screening candidate donors and have put significant effort into identifying individuals with the desired T cell profiles. We then use proprietary growth strategies and media to maintain the selected phenotype throughout the CAR T manufacturing process. Importantly, our one-step genome editing approach helps minimize cell processing time, which helps prevent the CAR T cells from differentiating during the process. We believe our 10-day allogeneic manufacturing process is the shortest in the industry.
- **Consistency.** By targeting the insertion of the CAR gene to a defined location in the DNA of the cell, we are able to produce populations of T cells that are identical at the DNA level. This makes the cells in our CAR T cell drug formulation less heterogeneous as compared to manufacturing processes that use lentiviral vectors. Importantly, our genome editing process gives us greater control over the amount of CAR that is expressed on the surface of each CAR T cell, which determines how easily the CAR T cell is activated once it encounters a cancer cell. This allows us to "fine-tune" the CAR T cells to ensure that they respond appropriately to the cancer but do not become hyper-activated or exhausted. The below comparison demonstrates the difference in consistency achieved by using lentivirus delivery compared with targeted delivery through an ARCUS nuclease. CAR T cells produced using ARCUS exhibit reduced cell-to-cell variability as well as more controlled levels of CAR gene expression depending on whether the calls are tuned for high expression or low expression.



- **Scalability.** To realize the potential benefits of allogeneic CAR T cell therapy, it will be important to manufacture as many cells as possible in each batch in accordance with GMP. Scaling efficiently requires scale-up at every step in the process and, as with all drug manufacturing, process development takes significant time and capital. We made the decision early in the development of our CAR T cell platform to invest in process development and manufacturing rather than initiating clinical trials with a process that would not fully support development and commercialization. We did this, in part, because we believed that several attributes of ARCUS, such as high specificity and high knockin efficiency, would allow us to scale manufacturing more effectively than our competitors. As a consequence of our early investment and the one-step editing method enabled by ARCUS, our manufacturing process today is *scaled* as opposed to *scalable*. We are manufacturing our lead anti-CD19 allogeneic CAR T cell product candidate at multi-billion

cell scale consistently, and our best manufacturing runs have yielded over one hundred doses of drug product at a dose of 1e6 CAR T cells/kg, which is the middle dose in our forthcoming Phase 1/2a clinical trial.

In order to maximize the potential of our CAR T cell platform, we have developed extensive in-house capabilities to support the entire process, from discovery to manufacturing, including:

- A fully human antibody platform for the production of novel CAR binding domains.
- A proprietary collection of costimulatory signaling domains that, if incorporated into a CAR, induce the cell to multiply in response to exposure to cancer cells.
- A high-throughput method for screening new CARs to evaluate their cancer killing activity and target specificity.
- ARCUS for knocking genes out or in to optimize the genetics of our CAR T cells.
- An in-house adeno-associated virus, or AAV, platform for the production of CAR-encoding AAV vectors.
- An in-house mRNA platform for the production of ARCUS-encoding mRNA.
- An in-house animal facility with real-time tumor imaging capabilities.
- Proprietary cytometry panels, potency assays and other bioanalytics for product quality control and release.
- Proprietary manufacturing process for large-scale production of GMP CAR T cells.
- In-house GMP manufacturing expect to be completed in the first half of 2019.

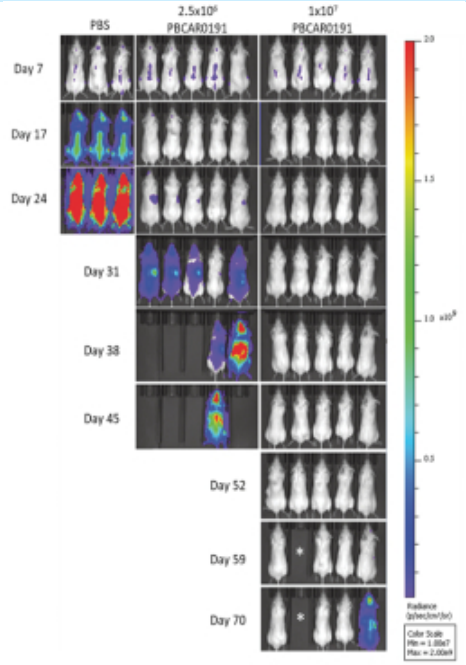
Our cancer immunotherapy (allogeneic CAR T cells) pipeline

We plan to leverage our CAR T cell platform to develop product candidates against validated CAR T cell targets in the near term. By focusing on vetted targets, we seek to avoid many technical hurdles associated with early clinical development and can validate our allogeneic platform in patients with fewer variables. This approach also allows us to leverage the abundance of available public resources for these targets, including CARs, cell and animal models, and clinical protocols. In parallel to advancing product candidates for validated CAR T cell targets, we are performing early-stage research on more challenging solid tumor targets for which the quality and efficiency of the genome editing is expected to be critical for success. Therefore, we expect that we will gradually shift from a focus on validated liquid tumor targets to more challenging solid tumor targets.

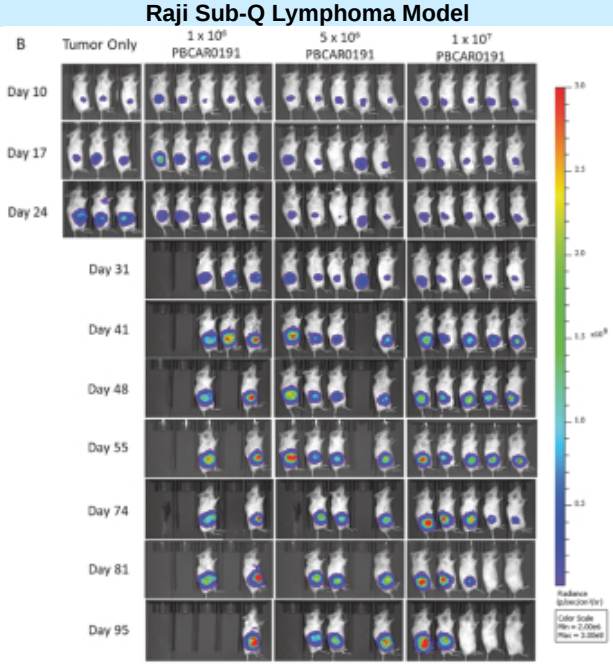
The first four product candidates in our CAR T cell development pipeline are:

- **PBCAR0191**. PBCAR0191 is an allogeneic anti-CD19 CAR T cell product candidate for ALL and NHL. CD19 is a protein that is expressed on the surface of B cells. It is a well-validated target for CAR T cell therapy and the two currently marketed autologous CAR T cell products (Yescarta and Kymriah) also target CD19. In February 2016, we entered into the Servier Agreement and we have agreed to develop allogeneic CAR T cell therapies for up to six unique antigen targets selected by Servier, one of these antigen targets is CD19. We submitted an IND to the FDA for our allogeneic PBCAR0191 in October 2018. As shown below, PBCAR0191 was observed to prolong survival in mouse models of leukemia (Nalm-6 model) and lymphoma (Raji Sub-Q model). Moreover, the gene edited cells were observed to not elicit GvHD, as measured by weight loss and survival, in a xenotransplantation model in which un-edited human T cells are exceedingly toxic.

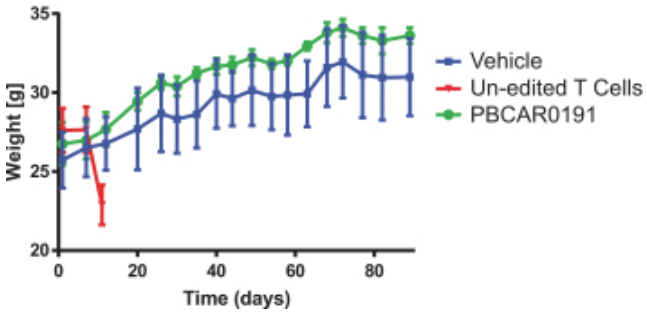
Nalm-6 Leukemia Model



Raji Sub-Q Lymphoma Model

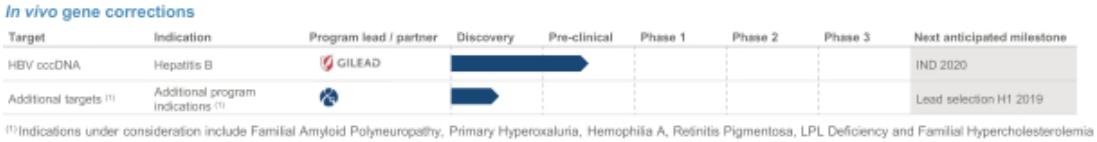


Gene Edited T cells do not elicit GvHD



- **PBCAR1201**. PBCAR1201 is an allogeneic anti-CD20 CAR T cell product candidate for Chronic Lymphocytic Leukemia. Like CD19, CD20 is a protein expressed on the surface of B cells. It is an established target for cancer treatment and several CD20-targeted therapies, such as the monoclonal antibody Rituxan, have long histories of clinical success. We have selected a development candidate for our anti-CD20 CAR T cell product and have observed tumor cell killing in *in vivo* preclinical animal studies. We anticipate submitting an IND to the FDA on PBCAR1201 in 2019.
- **PBCARBCMA1**. PBCARBCMA1 is an allogeneic anti-BCMA CAR T cell product candidate for Multiple Myeloma. BCMA is a protein that is expressed on the surface of mature B cells called “plasma cells” that are responsible for the disease. It is a validated target for CAR T cell and autologous therapies, such as bluebird bio’s bb2121 program, have yielded promising results in early clinical studies. We have selected a development candidate for our anti-BCMA product and have observed tumor cell killing in *in vivo* preclinical animal studies. We anticipate submitting an IND to the FDA on PBBCMA1 in 2020.
- **PBCARCLL1**. PBCARCLL1 is an allogeneic anti-CLL-1 CAR T cell product candidate for Acute Myeloid Leukemia, or AML. CLL-1 is a protein that is expressed on myeloid cells, including many AML cancer cells. It is less well-validated than the other targets that we are developing products against but we believe that it is worth investigation due to promising preclinical data and the very high unmet need in AML. We are currently screening CAR vectors to identify a development candidate to move into *in vivo* proof-of-concept studies. We anticipate submitting an IND to the FDA on PBCARCLL1 in 2020.

Our *in vivo* gene correction platform



Overview

We expect *in vivo* genome editing to be a significant focus of our operations long-term because the differentiated attributes of ARCUS are particularly advantageous for this type of application. *In vivo* gene correction involves the delivery of ARCUS nucleases directly into a patient’s cells to treat disease at the level of the underlying DNA. *In vivo* genome editing is more complex and challenging than *ex vivo* approaches like CAR T cells due to the need to safely deliver ARCUS directly to cells in the body. We believe that *in vivo* applications are particularly well suited to ARCUS because they require extremely low levels of off-target editing and efficient delivery.

Due to the demands of *in vivo* editing, we are taking a highly disciplined approach to managing our project portfolio that emphasizes studies in large animals, using both viral and non-viral delivery technologies. We believe that there is a remarkable lack of large animal data in the genome editing field and that demonstrating safety and efficacy in large animals is an important gating step prior to beginning human clinical studies. Thus, we are advancing an extensive and diverse portfolio of programs toward *in vivo* efficacy and toxicity studies and are generating a large animal dataset that, we believe, will be the most comprehensive of any in the field.

Treatment of genetic disease

Genetic diseases are caused by errors in the DNA that lead to misfunction of a cell or tissue. While the underlying cause of a particular genetic disease can often be complex and variable, DNA errors generally fall into two categories: loss-of-function or gain-of-function. Genetic diseases are most frequently caused by

loss-of-function errors in which a particular gene is mutated at the DNA level in such a way that it is either non-functional or less functional than it should be. In these cases, treating the disease requires *adding* the function that the cell or tissue is otherwise lacking. Gain of function genetic disorders are the result of DNA errors that cause a gene to acquire a new, harmful function that leads to disease. In these cases, it is necessary to remove the unwanted function to treat the disorder.

Genetic disease is a very active area of therapeutic development, and the therapies that are available or in development are, to a large extent, as variable and specialized as the diseases themselves. There are, however, two gene therapy platform approaches that are being broadly applied to the treatment of multiple genetic disorders. For the treatment of loss-of-function diseases, AAV-based gene therapy can often be an effective treatment. AAV is a non-integrating virus that can be used to deliver DNA to a wide range of different cell types in a patient. The virus can be engineered to deliver a functional copy of a gene that is otherwise missing or under-performing in the cell. This approach can, in some cases, restore normal function to the cell and alleviate the symptoms of the disease.

While a number of AAV-based gene therapies appear to be showing great promise in clinical trials, the approach is subject to a number of limitations. Many patients have antibodies in their blood that recognize and inactivate the AAV virus before it can deliver the DNA into the patient's cells. In addition, among patients who do *not* have antibodies upon initial treatment with the virus, most will develop antibodies following the first dose. Therefore, in most cases, it is only possible to dose a patient one time. Most importantly, although AAV-based gene therapy can be an effective treatment, it is probably not a permanent *cure* because AAV-delivered genes do not generally persist for more than a few years in the body. While the duration of virus persistence varies from cell-to-cell and from patient-to-patient, it is not believed to be permanent and symptoms of the disease can return once the virus is no longer present in the body.

A second platform gene therapy approach, RNA interference, or RNAi, has been shown to be an effective treatment strategy for many gain-of-function genetic disorders. These therapies usually take the form of a small-interfering RNA, or siRNA, which is a short piece of synthetic RNA that can "silence" or partially inactivate a deleterious gene if it is delivered to a cell in sufficient quantities. Therapeutic siRNA is most frequently used to silence genes with gain-of-function mutations that are expressed in the liver. This is because the siRNA molecules can be delivered efficiently to liver cells following IV infusion using a variety of different delivery approaches. Like AAV-based gene therapy, the primary limitation of RNAi approaches is that they lack permanence. siRNA drugs have a limited lifetime and, therefore, must be administered repeatedly for the life of the patient in order to be effective. While longer half-life siRNA drugs are showing persistence for up to six months, we believe there is a need for therapeutic options that untether the patient from regular drug treatments by addressing the underlying cause of the disease.

Our approach to* in vivo *gene correction

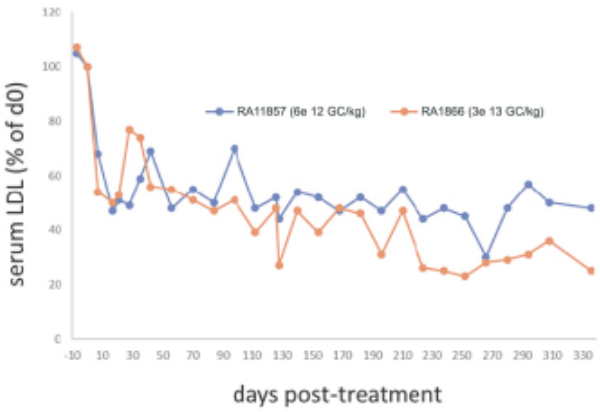
Our goal is to cure genetic diseases by correcting the DNA errors responsible for causing them. In principle, *in vivo* genome editing can likely be used to cure any genetic disorder. In practice, however, *in vivo* genome editing is limited by several challenges that, we believe, are best addressed using ARCUS:

- **Specificity.** *In vivo* genome editing requires an extremely high degree of precision to minimize the occurrence of any unwanted off-target editing. Off-target changes to the DNA could, potentially, have significant safety implications that may not manifest themselves until well after administration of the therapy. As enumerated above, we believe that the differentiated attributes of ARCUS enable us to create endonucleases that have a very high degree of specificity and minimal levels of off-target editing to address this significant safety concern.

- **Delivery.** Gene delivery technologies suitable for the delivery of genome editing endonucleases to tissues *in vivo* have not been developed for all tissues. Delivery challenges are particularly pronounced for editing applications that require promoting DNA repair by HDR because it is necessary to deliver both the nuclease and the DNA "donor" template for HDR. We have focused our initial development efforts on genetic disorders of the eye and liver, two tissues for which we believe we have good options for delivery and in which we have shown ARCUS to be effective in preclinical studies. We believe the small size of our ARCUS nucleases and their ability to efficiently promote HDR will enable us to address a greater variety of genetic diseases requiring more complex delivery strategies.
- **Efficiency.** Genome editing efficiency is a critical parameter for *in vivo* therapeutic efficacy because the requisite edit must be achieved in a sufficient number of cells to have therapeutic benefit. Efficiency is best measured *in vivo* in animals because it is affected by multiple parameters including delivery, endonuclease activity and the accessibility of the DNA target site in the organism. Moreover, we believe that only large animals such as non-human primates accurately model these different parameters and are representative of the human condition. As such, we have placed a good deal of emphasis on large animal studies and have demonstrated, we believe, therapeutic levels of editing efficiency using ARCUS in the most relevant models. This gives us greater confidence that ARCUS will translate from the lab bench to the clinic.

The potential of ARCUS for *in vivo* genome editing is highlighted in a July 2018 publication in *Nature Biotechnology* that describes a research project performed as part of a collaboration between our company and Dr. Jim Wilson's Orphan Disease Center at the University of Pennsylvania. Co-authors of the publication include Derek Jantz and Jeff Smith, two of our co-founders. This publication is, to our knowledge, the first peer-reviewed publication of *in vivo* genome editing data in non-human primates. The publication reported well tolerated, long-term, high-efficiency editing of the PCSK9 gene in non-human primates using ARCUS. A single IV administration of an AAV vector encoding a PCSK9-specific ARCUS nuclease was able to efficiently knock out the gene in the livers of Rhesus macaques, a species of monkey, resulting in up to approximately 85% reduced levels of PCSK9 protein in the blood. This reduction in PCSK9 then resulted in significantly reduced levels of LDL-C, commonly known as "bad cholesterol," in the blood of treated animals. Because this therapeutic effect is due to modifications to the DNA itself, the benefit of the treatment appears to be permanent. The first animals that were treated have maintained reduced levels of PCSK9 and LDL-C since they were treated in February 2017. Importantly, even at the highest dose the treatment was observed to be well tolerated. These peer reviewed data exemplify the power of ARCUS for *in vivo* editing at therapeutically meaningful levels of efficiency.

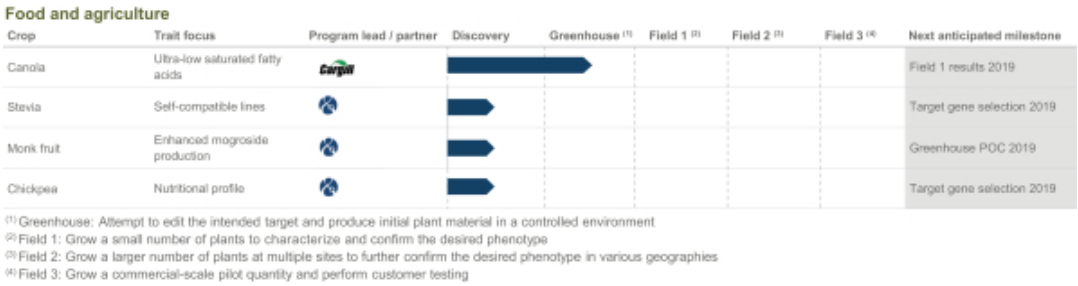
LDL Serum Levels



We believe that establishing collaborations with other groups that have domain expertise and access to the most relevant animal models will be important to advancing our *in vivo* editing platform, and we have entered into a number of collaborations and licensing agreements with third parties to help us advance our *in vivo* editing portfolio. In particular, in September 2018 we announced a sponsored research agreement with the Orphan Disease Center at the University of Pennsylvania. This organization, led by Dr. Jim Wilson, is dedicated to curing rare genetic diseases and has access to unique expertise and resources, including AAV vector production and non-human primate models. Several of our liver-directed projects are being conducted in collaboration with Dr. Wilson under this agreement. In September 2018, we also announced a partnership with Gilead to co-develop an ARCUS-based treatment for chronic Hepatitis B infection. Infection by the Hepatitis B Virus is in many ways analogous to a gain-of-function genetic disorder. In this case, the deleterious DNA that needs to be eliminated is the genome of the virus itself. To this end, Precision and Gilead are working together to develop an ARCUS-based drug that specifically targets and eliminates virus DNA from infected liver cells.

We believe that our proprietary ARCUS genome editing platform, strong collaborations and a disciplined approach to preclinical development that emphasizes large animal studies will help position us to unlock the enormous potential of therapeutic *in vivo* editing.

Our food and agriculture platform



Technology-centric solutions to meet changing demands in food and agriculture

Improvements in food and agriculture have been central to the development of the modern world. The total global food and agriculture market, estimated to be at $5 trillion (2015), is heavily influenced by population growth, highly urbanized population, access to disposable income and changing consumer behavior. With the global population projected to reach 8.5 billion by 2030, demand for basic food and nutrition needs has already put a lot of pressure on traditional food production systems. In response, the agriculture industry is currently in the process of a slow, but massive, repositioning effort to reinvent its capital-intensive infrastructure, complex business structures and product pipelines. The food and agriculture industry has also seen significant shifts in consumer preferences where consumers are actively transitioning to high quality and healthier foods and beverages, while rejecting artificial ingredients, sugar and salt, creating a demand for natural and holistic ingredients built on a sustainable supply chain. Traditional approaches to agricultural innovation are slow, siloed, rely heavily on non-scalable academic advancements and continue to use inefficient crop improvement practices. It is our belief that the current pressures on the food and agriculture industry from imminent threats like food insecurity, nutritional insecurity, new pests and diseases, the impact of climate change, and an ever-increasing incidence of diet related illnesses, can only be met by addressing the unmet needs at a systems level, through technology and creative business models.

Elo Life Systems: Innovation-focused technology platform and business model

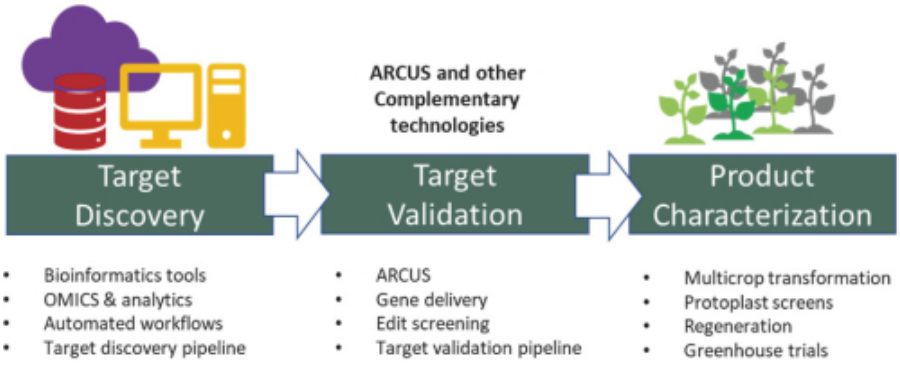
Elo Life Systems is our wholly owned subsidiary, dedicated to addressing the needs of consumers and consumer-facing industries in the food and agriculture sector. By combining the power of our technology

platform with a differentiated collaboration-based business model, we are enabling our partners to address emerging opportunities in food and agriculture. Further, our business model enables us to remain capital efficient throughout the product-development cycle while generating revenue through various revenue-sharing models; the industry partners gain access to our technology platform and our continuously improving knowledgebase.

Partnership-based Business Model

Elo's technology platform

Our end-to-end food and agriculture platform is built to support rapid innovation across multiple crop species. With our ARCUS genome editing platform as our cornerstone technology, we have integrated complementary tools and technologies both upstream and downstream of this pipeline.



End-to-End Food and Agriculture Platform

We are one of the first to apply genome editing technology to crop plants and we believe we have the most in-depth experience in crop genome editing in the industry. Over the last decade, we have developed highly efficient methods to improve delivery and functionality of ARCUS nucleases in plants to edit DNA. These nucleases have been successfully validated in collaborative projects with major food and agriculture companies like Cargill, BASF, Bayer CropScience and DuPont Pioneer Hi-bred. A comparison of the three breeding

approaches (below) elucidates the value of ARCUS as the preferred genome editing platform for crop improvement.

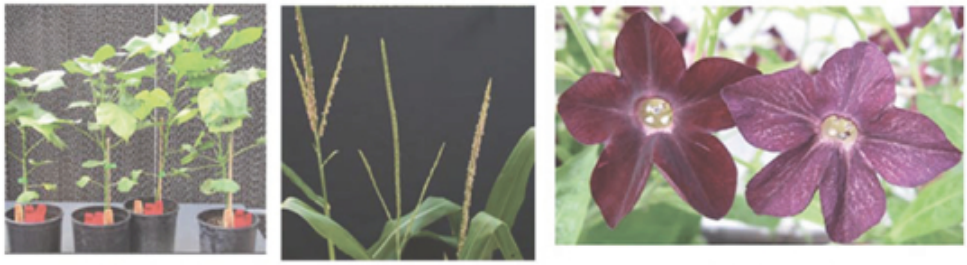
	Traditional breeding	Mutagenesis breeding	Precise breeding
Can specific gene(s) be targeted to generate a desired phenotype?	Yes	Yes	Yes
How is it done?	Crossing and selecting plants over several generations	Chemical or radiation induced random mutations in the genome. Select one with a desired mutation	Precisely edit a gene of interest by targeting a specific DNA sequence encoding that gene
How many unintended genes perturbed or mutated?	Very high	High	Few to none
Product development timelines	10-20 years	7-10 years	3-5 years

Capabilities from discovery to development

Elo's food and agriculture platform serves as an attractive proposition for companies in the industry for the following reasons:

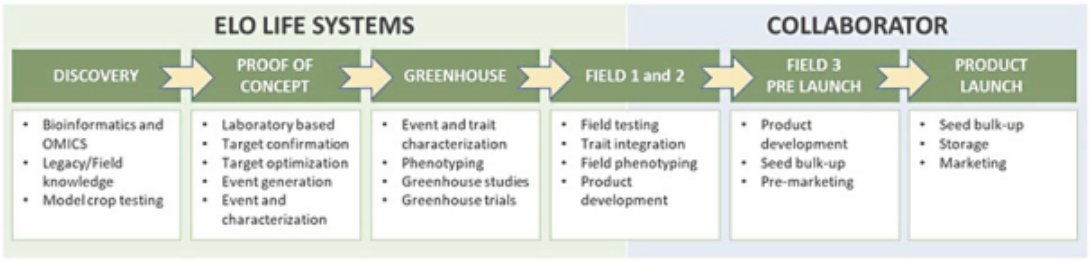
- **Robust target discovery.** Elo's multiscale biology-based computational workflow is built on the principles of machine learning and therefore scalable and highly adaptable across crops.
- **Scalable target validation.** ARCUS nucleases have been successfully used in multiple crops of commercial importance like cotton, rice, canola, maize, petunia and alfalfa. The nucleases optimized specifically for applications in plants using our proprietary methods show a high degree of editing efficiency with minimal off-site targeting. Further the small size of the nuclease enables a differentiated technical advantage by improving nuclease delivery efficiencies into cells.
- **Access to other complementary technologies and expertise.** Our platform integrates expertise across traditional (molecular breeding) and novel (next-gen sequencing) complementary technologies. This holistic approach enables us to rapidly integrate historical datasets into our discovery pipeline and help springboard innovative programs leading to novel products.
- **Multi-crop expertise and experience.** We are a solutions-focused company that partners with key players in the food and agriculture space to improve crops through technology. For this reason, we have built capabilities that are broadly applicable to improving a diverse portfolio of crops like canola, soybean, rice, stevia, cucumber, watermelon, alfalfa and sorghum.

We have used ARCUS to implement genome edits in a variety of plants as shown by the following:



ARCUS edited Cotton | ARCUS edited male sterile Maize | ARCUS edited ornamental Nicotiana

We are building our platform to serve as an integrated accelerator for all critical stages of product development- from target gene discovery to generation of pre-breeding material. In the advanced stages, collaborators will assume responsibilities of navigating the project through the final stages of development and into commercialization. We classify our stages of food product development as Discovery, Greenhouse, Field 1, Field 2 and Field 3. In Discovery, we identify the trait and genetic targets of interest. In Greenhouse, we attempt to edit the intended target and produce initial plant material in a controlled environment. In Field 1, we grow a small number of plants in the field to characterize and confirm the desired phenotype. In Field 2, we grow a larger number of plants at multiple sites to further confirm the desired phenotype in various geographies. In Field 3, we grow a commercial-scale pilot quantity and perform customer testing.



Elo's Food Product Candidate Development Pipeline

Ultra-low saturated fatty acid canola oil (in collaboration with Cargill Inc.)

Canola oil is the third largest vegetable oil by volume after palm and soybean oil. In the United States, canola oil is one of the most widely consumed oils, second only to soybean oil. With worldwide production at 30 million metric tons in 2017, the global canola oil is estimated to be a $20 billion industry.

Cargill is one of the world's largest growers and processors of canola. Since 2014, Elo and Cargill are engaged in a collaboration to produce ARCUS-optimized canola varieties and have achieved significantly lower levels (less than 4.5%) of saturated fatty acids compared to the current levels (7%). This oil with the desirable premium trait, is intended for the quick-service restaurants and food ingredients industries, and products made with it—particularly fried foods—may be able to use front-of-package nutrient content claims on saturated fat levels, such as "Low in Saturated Fat" or "No Saturated Fat," depending on their overall nutritional profile.

This program has generated canola varieties with up to an approximately 38% decrease in total saturated fats compared to unedited varieties. These edited varieties are currently being evaluated in greenhouse and field trials.

Low-calorie sweeteners from stevia and monk fruit

The $2 billion low-calorie sweetener market is the fastest growing segment in the sweetener industry given the recent data connecting excessive consumption of high fructose corn syrup and cane sugar has been linked to diabetes, metabolic syndrome and heart disease. Changing consumer preferences over the last few years are expected to contribute to a greater than 4% CAGR growth from 2017 to 2027 for natural, high intensity sweeteners like stevia and monk fruit. We expect this market to grow rapidly as the food and beverage industry reacts to increased taxation on beverages sweetened with cane sugar and transitions to natural alternatives.

Over the past decade, stevia has emerged as a preferred low-calorie sugar substitute. However, stevia is subject to a number of disadvantages, including undesirable aftertaste, complex biology, unsustainable production practices and supply chain issues. Self-incompatibility, or a genetic condition that prevents self-fertilization and promotes outcrossing for flowering plants, has been identified as one of the main limitations in stevia improvement. We believe changing that property of stevia will not only address the issues limiting the food industry from fully embracing stevia into their product development pipeline, but will introduce new breeding strategies to expeditiously improve the crop. At Elo, we are currently developing self-compatible stevia varieties to help advance global stevia production, address current issues within the stevia supply chain. Our stevia products will allow us to develop varieties suitable for cultivation in the United States, the largest and fastest growing market for low-calorie sweeteners.

The food and beverage industry sees a high-intensity sweetener from monk fruit as a possible solution to issues with stevia. The monk fruit compound, Mogroside V, is approximately 300 times sweeter than cane sugar and has been identified as an excellent alternative to cane sugar and stevia. We are currently engaged in studying the mogroside biosynthetic pathway in monk fruit and other related crops with the goal of scaling up Mogroside V as a viable option for the industry.

Plant-based proteins

Shifting consumer preferences across the globe towards plant-based proteins have been greatly influenced by reports correlating animal protein to lifestyle diseases, such as diabetes and heart disease, sustainability and climate change. This demand for plant-based proteins, projected to grow to a $10.5 billion global industry by 2020, cannot be met by the pulse and legume industries that use traditional breeding methods.

We are developing novel strains of pulse crops with improved agronomic performance, improved nutritional profiles and enhanced sensory qualities to facilitate rapid integration into the food industry. By creating new varieties of pulses and legumes, we are creating new opportunities for the food industry to incorporate the raw materials into their product pipeline. We have embarked on a pulse improvement program which will be heavily aided by our multi-omics-based target discovery platform and our expertise in multi-crop transformation. We aim for the resulting products to make a significant contribution towards the increasing demand for sustainable plant-based proteins as a healthful alternative to animal protein.

Manufacturing

We currently contract with third parties for the manufacturing of materials used in the production of our product candidates. To date, our third-party manufacturers have met our manufacturing requirements. We believe that there are alternate sources of supply that can satisfy our requirements.

The manufacturing process for our cancer immunotherapy (allogeneic CAR T cells) platform utilizes a one-step cell engineering method in which a CAR gene is targeted directly into the T cell receptor alpha constant, or TRAC, locus. We believe this approach greatly streamlines the manufacturing process. Commercial raw

materials and reagents for this production are readily available. Our manufacturing strategy for our *in vivo* gene correction platform and our food and agricultural platform is to internally control process development and manufacturing to safeguard the proprietary nature of our technology and facilitate our ability to function as an integrated life sciences company.

We are building strong internal scientific process development and manufacturing capabilities, including investing in building a cGMP-compliant manufacturing facility to support our therapeutic product development platforms. We believe that having internal manufacturing capacity and expertise will be a competitive advantage that enables enhanced control over process development timelines, costs and intellectual property.

We are in the planning stages of building a cGMP-compliant manufacturing facility. We have leased approximately 17,300 feet of space for our manufacturing facility at a location approximately seven miles from our headquarters in Durham, North Carolina. We expect to have a modular, three suite cleanroom setup, for CAR T cell, mRNA and AAV production, to process development for our cancer immunotherapy (allogeneic CAR T cells) platform. We expect that our manufacturing facility will leverage single use, disposable, closed system operations aligned to our technology platforms to ensure both flexibility and cost effectiveness. The initial scope will be for preclinical through Phase 1/2a manufacturing.

License and collaboration agreements

Servier

In February 2016, we entered into the Servier Agreement, pursuant to which we have agreed to develop allogeneic chimeric antigen receptor T cell therapies for up to six unique antigen targets selected by Servier. Upon selection of an antigen target by Servier, we perform early-stage research and development on individual T cell modifications for the selected target, develop the resulting therapeutic product candidates through Phase 1 clinical trials and prepare clinical supply of such product candidates for use in Phase 2 clinical trials.

We received an upfront payment of $105.0 million under the Servier Agreement. At Phase 2 readiness for any product candidate covered by the Servier Agreement, Servier may exercise a commercial option to proceed with development and commercialization of the product candidate, subject to option fees. We have the ability to receive total payments, including the upfront payment, option fees and milestone payments, in the aggregate across all six targets that may be selected by Servier, of up to approximately $1.6 billion, as well as the payment of tiered royalties ranging from the mid-single digit percentages to the low double digit percentages on world-wide net sales of any products developed under the Servier Agreement, subject to customary potential reductions. Servier's obligation to pay royalties to us expires on a country-by-country and licensed product-by-licensed product basis upon the later of (1) the expiration of the last to expire valid claim of all Precision patents covering a licensed product, (2) expiration of all regulatory exclusivity with respect to a licensed product in the applicable country of sale, and (3) the expiration of a certain number of years following the first commercial sale of a licensed product in a country. We also have the right to participate in the development and commercialization of any licensed products resulting from the collaboration through a 50/50 co-development and co-promotion option in the United States, subject to our payment of an option fee, which is exercisable after Servier's commercial option exercise. So long as Servier holds a commercial license with respect to any particular licensed product, we may not develop, manufacture or commercialize any engineered human T cells with chimeric antigen receptors for use in humans directed to the same antigen target as the target of that licensed product.

Unless terminated earlier, the Servier Agreement expires upon the first to occur of (1) the expiration of the period in which Servier may nominate antigen targets, if there are no targets nominated by Servier, (2) the expiration of the period in which Servier may exercise a commercial option on a licensed product candidate, if no commercial options have been exercised by Servier, or (3) the expiration of the last to expire royalty term

for the licensed products and satisfaction of all of Servier's payment obligations under the agreement. Servier has the right to terminate the agreement for convenience, either in its entirety or on a target-by-target or product-by-product basis, by providing advance notice to us. We may terminate immediately upon notice to Servier if Servier (itself or through the use of certain affiliates or a third party) or any sublicensee initiates or participates in a patent challenge against our patents licensed by Servier under the agreement. In addition, the Servier Agreement may be terminated (a) by either party for the other party's material breach that remains uncured as specified in the agreement, (b) by either party upon the occurrence of certain insolvency-related events of the other party and (c) upon mutual agreement of the parties in the event either party suffers an event of force majeure as specified in the agreement. If Servier terminates the agreement for our uncured material breach of provisions in the agreement that restrict development, manufacture or commercialization of engineered human T cells with chimeric antigen receptors for use in humans directed to a target selected by Servier, certain licenses we grant to Servier will become royalty-free, fully paid-up, perpetual and irrevocable with respect to the licensed product candidates and licensed products directed to the target that was the subject of such breach, and Servier will be deemed to have previously exercised its commercial option for any then-existing licensed product candidates directed to such target.

Gilead

In September 2018, we and Gilead entered into a collaboration and license agreement, which we refer to as the Gilead Agreement, to develop genome editing tools using ARCUS to target viral DNA associated with the Hepatitis B virus. Pursuant to the terms of the agreement, Gilead received an exclusive license to exploit the resulting synthetic nucleases and products that use them to treat the Hepatitis B virus in humans, and we are entitled to receive up to approximately $40 million in research funding over an initial three year term and milestone payments of up to an aggregate of $445 million. We are also entitled to receive tiered royalties ranging from the high single digit percentages to the mid-teen percentages on world-wide net sales of the products developed through the collaboration, subject to customary potential reductions. Gilead's obligation to pay royalties to us expires on a country-by-country and licensed product-by-licensed product basis, upon the latest to occur of certain events related to patents, regulatory exclusivity or first commercial sale of the product.

Unless terminated earlier, the Gilead Agreement will continue, on a licensed-product-by-licensed-product and country-by-country basis until the expiration of a defined royalty term for each licensed product and country. Gilead has the right to terminate the Gilead Agreement for convenience by providing advance notice to us as specified in the Gilead Agreement. Gilead may also terminate the agreement during the collaboration term if we enter into certain change of control transactions with a third party that is clinically developing or commercializing products in the field of the Hepatitis B virus. In addition, either party may terminate the Gilead Agreement (1) for material breach by the other party and a failure to cure such breach within the time period specified in the Gilead Agreement and (2) upon the occurrence of certain insolvency-related events of the other party.

Duke University

In April 2006, we entered into the Duke License, pursuant to which Duke granted us an exclusive (subject to certain non-commercial rights reserved by Duke), sublicensable, worldwide license under certain patents related to certain meganucleases and methods of making such meganucleases owned by Duke to develop, manufacture, use and commercialize products and processes that are covered by such patents, in all fields and in all applications. The patents that we license pursuant to the Duke License have been generated through the use of U.S. government funding and are therefore subject to certain federal regulations. See "Risk factors— Risks related to intellectual property—Some of our in-licensed intellectual property has been discovered

through government funded programs and thus may be subject to federal regulations such as “march-in” rights, certain reporting requirements and a preference for U.S.-based companies, and compliance with such regulations may limit our exclusive rights, and limit our ability to contract with non-U.S. manufacturers.”

Under the Duke License, in addition to upfront licensing fees, we are also required to pay Duke (1) a total of $0.3 million in milestone payments, a portion of which we paid upon the completion of our Series A financing, a further portion of which we paid upon our first signed partnership in excess of $1 million, and the remainder of which we will be required to pay upon successful commercialization of seed traits and human therapeutics, (2) royalties in the low single digit percentages on net sales of licensed products and licensed processes sold by us and our affiliates, subject to certain reductions in certain circumstances, with certain annual minimum royalties, and (3) certain percentages of sublicensing revenue received under sublicenses granted to third parties, which are creditable against annual minimum royalties and are subject to certain reductions in certain circumstances. For sublicenses of non-commercial products, the percentage of sublicensing revenue payable to Duke is in the mid-teen percentages for sublicense revenues owed from royalties received and low double-digits for sublicense revenues owed from non-royalty payments. For sublicenses of commercial products created by us and derivatives thereof, the percentage is determined by the highest negotiated royalty rate in such sublicense. If the highest negotiated royalty rate between us and our sublicensee exceeds a mid-single digit percentage, the percentage of sublicensing revenue payable to Duke will be high single digit, decreasing to low single digit as the highest negotiated royalty rate in such sublicense increases. The Duke License will expire upon the expiration of the last-to-expire patent that is licensed to us. We may terminate the Duke License by providing advance written notice as specified in the Duke License. Either party may terminate the Duke License in the event of the other party’s uncured material breach or for the other party’s fraud, willful misconduct or illegal conduct with respect to the subject matter of the Duke License.

Cellectis S.A.

In January 2014, we entered into a cross-license agreement with Cellectis S.A., which we refer to as the Cellectis License, in connection with a settlement of litigation matters (1) between Cellectis and us and (2) among Cellectis, Duke and us. Cellectis granted us a non-exclusive, sublicensable, worldwide, fully paid, royalty-free license to certain modified I-CreI homing endonuclease patents and Cellectis patents asserted in the litigation, to make, use and commercialize modified I-CreI homing nucleases and products developed using such nucleases, in all fields. The license we received from Cellectis is subject to the rights of a preexisting license agreement that Cellectis entered into with a third party, and the license granted to us excludes any rights exclusively granted by Cellectis under such preexisting license, which preexisting license is limited to certain specific applications unrelated to the fields of human therapeutics and plant agriculture, for so long as the rights under the preexisting license remain exclusive.

We granted Cellectis a non-exclusive, sublicensable, worldwide, fully paid-up, royalty-free license to certain modified I-CreI homing endonuclease patents and our patents asserted in the litigation matters (1) between Cellectis and us and (2) among Cellectis, Duke and us to make, use and commercialize modified I-CreI homing nucleases and products developing using such nucleases, in all fields except those for which we did not receive rights from Cellectis due to the preexisting license.

The Cellectis License will expire upon the expiration of the last-to-expire valid claim of all of the patents licensed to or from each of the parties to the agreement. Either party may terminate any of the licenses granted under the agreement (1) in the event of the other party’s material breach, subject to an opportunity to cure within the time period specified in the Cellectis License, or (2) if the other party directly or indirectly challenges a patent licensed to it by the other party.

Competition

As a diversified life sciences company, we compete in multiple different fields. The biotechnology, pharmaceutical and agricultural biotechnology industries are characterized by rapidly advancing technologies, intense competition and a strong emphasis on intellectual property and proprietary products. We principally compete with others developing and utilizing genome editing technology in the human health and plant sciences sectors, including companies such as Cellectis S.A., CRISPR Therapeutics, AG, Editas Medicine, Inc., Intellia Therapeutics, Inc. and Sangamo Therapeutics, Inc.

We compete with many biotechnology and pharmaceutical companies, academic research institutions, governmental agencies and public and private research institutions. We expect that our operations focused on CAR T cell product development and commercialization will face substantial competition from those focusing on immunotherapy solutions. Several companies, including Novartis Pharmaceuticals Corp. and Gilead Sciences, Inc., have obtained FDA approval for autologous cell therapies, and a number of companies, including Cellectis S.A., Celgene Corp., Allogene Therapeutics and CRISPR Therapeutics AG, are pursuing allogeneic cell therapies. We expect that our operations focused on developing products for *in vivo* treatment of genetic disease will face substantial competition from others focusing on gene therapy treatments, especially those that may focus on conditions that our product candidates target. Moreover, any human therapeutics products that we may develop will compete with existing standards of care for the diseases and conditions that our product candidates target and other types of treatments, such as small molecule, antibody or protein therapies.

Many of our current or potential competitors in the therapeutics space, either alone or with their collaboration partners, have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials and marketing approved products than we do. In addition to competing on the bases of safety, efficacy, timing of development and commercialization, convenience, cost, availability of reimbursement and rate of adoption of potential product candidates, we may also compete with these competitors in recruiting and retaining qualified personnel, establishing clinical sites, establishing relationships with collaborators or other third parties, registering patients for clinical trials and acquiring technologies complementary to, or necessary for, our product development platforms. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than any products that we may develop. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market.

We also compete with participants in the agricultural biotechnology space, including Pairwise Plants, LLC, Caribou Biosciences, Inc., Corteva Agriscience, Tropic Biosciences UK LTD, Calyxt, Inc. and Cibus. Competition for improving plant genetics comes from conventional and advanced plant breeding techniques, as well as from the development of genetically modified traits. Competition for providing more nutritious ingredients for food companies comes from chemical-based ingredients, additives and substitutes, which are developed by various companies. We also face less direct competition from trait research and development companies and agricultural research universities and institutions. We compete with respect to many aspects of the product development cycle in the plant sciences space, such as computational capabilities for identifying relevant gene targets, access to germplasm and enabling technologies and entry into strategic relationships to facilitate product development and commercialization.

Many of our current or potential competitors in the agricultural biotechnology space, either alone or with others, have significantly greater financial resources and expertise in research and development, manufacturing, testing and marketing approved products than we do. Mergers and acquisitions in the plant science, specialty food ingredient and agricultural biotechnology, seed and chemical industries may result in

even more resources being concentrated among a smaller number of our competitors. Smaller or early-stage companies may also prove to be significant competitors, particularly through strategic relationships with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel, as well as in acquiring technologies complementary to, or necessary for, our food and nutrition platform.

Intellectual property

Our success depends in part on our abilities to (1) obtain and maintain proprietary protection for ARCUS, (2) defend and enforce our intellectual property rights, in particular, our patent rights, (3) preserve the confidentiality of our know-how and trade secrets, and (4) operate without infringing valid and enforceable intellectual property rights of others. We seek to protect our proprietary position by, among other things, exclusively licensing U.S. and certain foreign patent applications, and filing U.S. and certain foreign patent applications, related to ARCUS, existing and planned programs, and improvements that are important to the development of our business, where patent protection is available. We also rely on trademarks, trade secrets, know-how, continuing technological innovation and confidential information and pursue licensing opportunities to develop and maintain our proprietary position and protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection. We seek to protect our proprietary technology and processes, in part, by confidentiality agreements and invention assignment agreements with our employees, consultants, scientific advisors, contractors and others who may have access to proprietary information, under which they are bound to assign to us inventions made during the term of their employment or term of service. We also seek to preserve the integrity and confidentiality of our data and trade secrets by maintaining physical security of our premises and physical and electronic security of our information technology systems.

We cannot be sure that patents will be granted with respect to any patent applications we have licensed or filed or may license or file in the future, and we cannot be sure that any patents we have licensed or which have been granted to us, or patents that may be licensed or granted to us in the future, will not be challenged, invalidated or circumvented or that such patents will be commercially useful in protecting our technology. Moreover, trade secrets can be difficult to protect. While we have confidence in the measures we take to protect and preserve our trade secrets, such measures can be breached, and we may not have adequate remedies for any such breach. In addition, our trade secrets may otherwise become known or be independently discovered by competitors. For more information regarding the risks related to our intellectual property, see “Risk factors—Risks related to our intellectual property.”

Our patent portfolio consists of a combination of issued patents and pending patent applications that are owned by us or licensed by us from third parties. As of September 30, 2018, we have an exclusive license from Duke University under 12 issued United States patents and two pending U.S. patent applications. In addition, as of September 30, 2018, we own 14 issued United States patents, 12 pending non-provisional U.S. patent applications, and seven pending PCT international patent applications. We also exclusively license from Duke or own many corresponding patents and patent applications outside the United States, as described below. We intend to pursue, when possible, additional patent protection, including composition of matter, method of use and process claims, related to ARCUS. We also intend to obtain rights to existing delivery technologies through one or more licenses from third parties.

ARCUS platform patent families

We license one patent family from Duke and own two patent families that are directed to the core technologies employed in our ARCUS platform for nuclease design. Thus, each of our product candidates is protected by one or more patents in these families.

The first family, licensed from Duke, includes 12 issued United States patents, eight issued European patents, three issued Japanese patents, and one issued patent in each of Australia and Canada. This family also includes one pending patent application in each of the United States, Europe, Japan and Canada. Patents in this family include claims directed to (1) recombinant meganucleases having altered cleavage specificity, altered heterodimer formation, and/or altered DNA binding affinity, (2) methods for cleaving target recognition sites in DNA using such meganucleases, and (3) methods for producing genetically modified eukaryotic cells using such meganucleases. Patents in this family have a standard expiration date of October 18, 2026, subject to potential extensions.

The second family, which we own, includes four issued United States patents, two issued patents in each of Europe and Japan, and one issued Australian patent. This family also includes one pending patent application in each of the United States, Europe, Japan and Australia. Patents in this family include claims directed to (1) recombinant single-chain meganucleases, and (2) methods for producing isolated genetically modified eukaryotic cells using such meganucleases. Patents in this family have a standard expiration date of October 31, 2028, subject to potential extensions.

The third family, which we own, includes one issued patent in each of the United States and Europe, and two issued Australian patents. This family also includes two pending patent applications in the United States and one pending patent application in Europe. Patents in this family include claims directed to methods of cleaving DNA at specific 4 base pair sites using a recombinant meganuclease. Patents in this family have a standard expiration date of July 14, 2029, subject to potential extensions.

Immunotherapy patent families

We own nine patent families that are directed to immunotherapy, including CAR T cell therapies. Some of these are applicable to immunotherapies and/or CAR T cells directed to killing a variety of different types of infected or cancerous cells. Others are directed to specific indications in which cells expressing particular antigens are targeted. Each of our immunotherapy product candidates is protected by one or more patents in these families.

The first family includes seven issued United States patents, and pending patent applications in each of the United States, Europe, Australia, Canada, China, Israel, Japan, Mexico and South Korea. Patents in this family include claims directed to (1) populations of genetically-modified human T cells in which 20%-65% of the cells have reduced expression of an endogenous TCR and express an anti-cancer antigen CAR from DNA inserted into the cells' TCR alpha constant region (TRAC) gene, (2) methods for using such populations of genetically modified human T cells for cancer immunotherapy, (3) pharmaceutical compositions comprising such populations of genetically modified human T cells, (4) genetically modified human T cells which have reduced expression of an endogenous TCR and express an anti-cancer antigen CAR from DNA inserted into the cells' TRAC gene, (5) methods for using such genetically modified human T cells for cancer immunotherapy, and (6) pharmaceutical compositions comprising such genetically modified human T cells. Patents in this family have a standard expiration date of October 5, 2036, subject to potential extensions.

The second family includes pending patent applications in each of the United States, Europe, Australia, Canada and Japan. Patent applications in this family include claims directed to (1) first-generation recombinant meganucleases that cleave a target in the TRAC gene, (2) nucleic acids and vectors encoding such recombinant meganucleases, (3) methods for producing genetically modified eukaryotic cells, including CAR T cells, using such meganucleases, and (4) methods of using such genetically modified eukaryotic cells for cancer immunotherapy. Patents in this family, if issued, will have a standard expiration date of October 5, 2036, subject to potential extensions.

The third family includes a pending provisional patent application in the United States. That provisional patent application includes claims directed to (1) second-generation engineered meganucleases that cleave a specific

target in the TRAC gene, (2) nucleic acids and vectors encoding such recombinant meganucleases, (3) methods for producing genetically modified eukaryotic cells, including CAR T cells, using such meganucleases, (4) genetically modified eukaryotic cells or populations of cells prepared by such methods, (5) pharmaceutical compositions comprising such cells or populations of cells, and (6) methods of treating diseases using such cells, populations of cells or pharmaceutical compositions to treat diseases, including cancer immunotherapy. Patents in this family, if issued, will likely have a standard expiration date of April 12, 2039, subject to potential extensions.

The fourth family includes a pending PCT international patent application. That PCT patent application includes claims directed to (1) nucleic acids encoding co-stimulatory domains having certain amino acid sequences, (2) recombinant DNA constructs and vectors comprising such nucleic acids, (3) nucleic acids and vectors encoding such recombinant meganucleases, (4) genetically modified cells comprising such nucleic acids, (5) methods for producing such genetically modified cells, (6) pharmaceutical compositions comprising such cells, and (7) methods of immunotherapy using such cells. Patents in this family, if issued, will have a standard expiration date of October 4, 2037, subject to potential extensions.

The fifth family includes a pending PCT international patent application. That PCT patent application includes claims directed to (1) methods of reducing cytotoxicity associated with DNA transfection in primary eukaryotic cells, (2) methods for increasing the number of gene-edited primary eukaryotic cells following DNA transfection, (3) methods for increasing gene editing frequency in primary eukaryotic cells following DNA transfection, (4) methods for increasing the number of primary eukaryotic cells comprising targeted insertion of an exogenous sequence of interest into the genome following DNA transfection, (5) methods for increasing insertion frequency of an exogenous sequence of interest into the genome in primary eukaryotic cells following DNA transfection, (6) methods for high throughput screening of primary human T cells expressing a CAR or exogenous TCR, (7) methods for high throughput screening of primary human T cells expressing a CAR or exogenous TCR, and (8) genetically modified primary eukaryotic cells produced by the methods. Patents in this family, if issued, will have a standard expiration date of April 30, 2038, subject to potential extensions.

The sixth family includes pending patent applications in the United States, Europe, Australia, Canada and Japan. Patent applications in this family include claims directed to (1) recombinant meganucleases that recognize and cleave a recognition sequence within the human beta-2 microglobulin gene, (2) nucleic acids and vectors encoding such recombinant meganucleases, (3) methods for producing genetically modified eukaryotic cells, including CAR T cells, using such meganucleases, (4) populations of genetically modified eukaryotic cells in which 80% of the cells have reduced expression of an endogenous TCR and 80% of the cells have reduced expression of beta-2-microglobulin, (5) pharmaceutical compositions comprising such populations of genetically modified eukaryotic cells, and (6) methods for using such genetically modified eukaryotic cells for cancer immunotherapy. Patents in this family, if issued, will have a standard expiration date of December 22, 2036, subject to potential extensions.

The seventh family includes a pending PCT international patent application. That PCT patent application includes claims directed to (1) nucleic acids encoding an engineered antigen receptor (e.g., a CAR) and an inhibitory molecule (e.g., an RNA interfering with beta-2-microblobulin expression), (2) genetically modified eukaryotic cells comprising such nucleic acids, (3) methods for producing such genetically modified eukaryotic cells using such nucleic acids and an engineered nuclease that promotes insertion of such nucleic acids, (4) genetically modified eukaryotic cells expressing an engineered antigen receptor and having expression of beta-2-microglobulin or MHC Class I molecules reduced by 10%-95%, (5) pharmaceutical compositions comprising such genetically modified eukaryotic cells, and (6) methods for using such genetically modified eukaryotic cells for immunotherapy. Patents in this family, if issued, will have a standard expiration date of May 8, 2038, subject to potential extensions.

The eighth family includes a pending PCT international patent application. That PCT patent application includes claims directed to (1) engineered meganucleases that recognize and cleave a recognition sequence in an upstream intron of the human TRAC gene, (2) nucleic acids and vectors encoding such engineered meganucleases, (3) methods for producing genetically modified T cells using such nucleic acids or vectors, (4) genetically modified T cells in which an exogenous sequence is inserted into an upstream of the human TRAC gene and endogenous TCR expression is reduced, (5) populations of such genetically modified T cells, (6) pharmaceutical compositions comprising such genetically modified T cells, and (7) methods of treating disease using such genetically modified T cells and pharmaceutical compositions, including cancer immunotherapy. Patents in this family, if issued, will have a standard expiration date of June 27, 2038, subject to potential extensions.

The ninth family includes a pending United States provisional patent application. That provisional patent application includes claims directed to (1) nucleic acids and vectors encoding certain modified human epidermal growth factor receptor, or EGFRs, (2) genetically modified cells and populations of cells, including T cells and CAR T cells, expressing such modified EGFRs, (3) methods for producing such genetically modified cells using such nucleic acids or vectors encoding such modified EGFRs, (4) pharmaceutical compositions comprising such genetically modified cells, (5) methods for isolating such genetically modified cells, (6) methods of treating disease using such genetically modified cells and pharmaceutical compositions, including cancer immunotherapy, and (7) methods of depleting such genetically modified cells in a subject using anti-modified EGFR antibodies. Patents in this family, if issued, will likely have a standard expiration date of October 3, 2038, subject to potential extensions.

Hepatitis B virus gene therapy patent families

We own two patent families that are directed to gene therapy for Hepatitis B Virus.

The first family includes a pending PCT international patent application. That PCT patent application includes claims directed to (1) engineered meganucleases that recognize and cleave recognition sites in the Hepatitis B virus (HBV) genome, (2) nucleic acids and vectors encoding such engineered meganucleases, (3) pharmaceutical compositions comprising such nucleic acids or meganucleases, and (4) methods for treating HBV infection using such meganucleases, nucleic acids and/or pharmaceutical compositions. Patents in this family, if issued, will have a standard expiration date of October 13, 2037, subject to potential extensions.

The second family includes a pending United States provisional patent application. That provisional patent application includes claims directed to (1) second generation engineered meganucleases that recognize and cleave recognition sites in the Hepatitis B virus, or HBV genome, (2) nucleic acids and vectors encoding such engineered meganucleases, (3) pharmaceutical compositions comprising such nucleic acids or meganucleases, and (4) methods for treating HBV infection using such meganucleases, nucleic acids and/or pharmaceutical compositions. Patents in this family, if issued, will likely have a standard expiration date of April 12, 2039, subject to potential extensions.

Hemophilia A gene therapy patent families

We own two patent families that are directed to gene therapy for Hemophilia A.

The first family includes a pending PCT international patent application. That PCT patent application includes claims directed to (1) engineered meganucleases that recognize and cleave recognition sites in a mutant Factor VIII gene, (2) nucleic acids and vectors encoding such engineered meganucleases, (3) pharmaceutical compositions comprising such nucleic acids or meganucleases, and (4) methods for treating Hemophilia A using such meganucleases, nucleic acids and/or pharmaceutical compositions. Patents in this family, if issued, will have a standard expiration date of May 3, 2037, subject to potential extensions.

The second family includes a pending United States provisional patent application. That provisional patent application includes claims directed to (1) engineered meganucleases that recognize and cleave non-methylated recognition sites in a mutant Factor VIII gene, (2) nucleic acids and vectors encoding such engineered meganucleases, (3) pharmaceutical compositions comprising such nucleic acids or meganucleases, and (4) methods for treating Hemophilia A using such meganucleases, nucleic acids and/or pharmaceutical compositions. Patents in this family, if issued, will likely have a standard expiration date of November 1, 2038, subject to potential extensions.

Other patent families

We own a pending PCT international patent application directed to engineered meganucleases and methods of treatment targeting the PCSK9 gene, which is associated with familial hypercholesterolemia. Patents in this family, if issued, will have a standard expiration date of April 20, 2038, subject to potential extensions.

We own pending patent applications in the United States, Europe, Australia, Canada and Japan directed to engineered meganucleases and methods of treatment targeting the rhodopsin gene, which is associated with retinitis pigmentosa. Patents in this family, if issued, will have a standard expiration date of September 8, 2036, subject to potential extensions.

We own pending patent applications in the United States, Europe, Australia, Canada and Japan directed to engineered meganucleases and methods of treatment targeting the dystrophin gene, which is associated with Duchenne Muscular Dystrophy. Patents in this family, if issued, will have a standard expiration date of March 12, 2035, subject to potential extensions.

We own pending patent applications in the United States and Europe directed to engineered meganucleases and methods of treatment targeting genomic trinucleotide repeats, which are associated with several trinucleotide repeat disorders. Patents in this family, if issued, will have a standard expiration date of May 2, 2036, subject to potential extensions.

We license from Duke a pending patent application in the United States directed to engineered fusion proteins comprising engineered meganuclease domains and effector domains which may be useful in controlling gene expression. Patents in this family, if issued, will have a standard expiration date of April 27, 2029, subject to potential extensions.

We own one patent and one pending patent application in the United States, and one pending patent application in Europe, directed to engineered meganucleases which target amplifiable genetic loci and may be useful in producing cells with amplified transgenes. Patents in this family will have a standard expiration date of June 1, 2032, subject to potential extensions.

We own pending patent applications in the United States and Europe directed to self-limiting viral vectors (e.g., AAV vectors) which encode engineered meganucleases which eliminate the vector after gene delivery. Patents in this family, if issued, will have a standard expiration date of June 20, 2036, subject to potential extensions.

We own, through our Elo Life Systems subsidiary, an issued United States patent directed to engineered meganucleases which target a genetic locus in maize and methods for genetically modifying that locus in maize. That patent has a standard expiration date of March 2, 2029, subject to potential extensions.

We own, through our Elo Life Systems subsidiary, a pending United States provisional patent application directed to engineered meganucleases which target the deoxyhypusine synthase gene and methods for genetically modifying that gene in plants. Patents in this family, if issued, will likely have a standard expiration date of November 20, 2038, subject to potential extensions.

For any individual patent, the term depends on the applicable law in the country in which the patent is granted. In most countries where we have filed patent applications or in-licensed patents and patent applications, patents have a term of 20 years from the application filing date or earliest claimed non-provisional priority date. In the United States, the patent term is 20 years but may be shortened if a patent is terminally disclaimed over another patent that expires earlier. The term of a U.S. patent may also be lengthened by a patent term adjustment to address administrative delays by the USPTO in granting a patent.

In the United States, the term of a patent that covers an FDA-approved drug or biologic may be eligible for patent term extension in order to restore the period of a patent term lost during the premarket FDA regulatory review process. The Hatch-Waxman Act permits a patent term extension of up to five years beyond the natural expiration of the patent. The patent term restoration period is generally equal to the portion of the FDA regulatory review period for the approved product that occurs after the date the patent issued, subject to certain exceptions. Only one patent may be extended for a regulatory review period for any product, and the application for the extension must be submitted prior to the expiration of the patent. In the future, we may decide to apply for restoration of patent term for one of our currently owned or licensed patents to extend its current expiration date, depending on the expected length of the clinical studies and other factors involved in the filing of the relevant BLA.

We or our licensors may be subject to claims that former employees, collaborators or other third parties have an interest in our owned or in-licensed patents or other intellectual property as an inventor or co-inventor. If we are required to and unable to obtain an exclusive license to any such third party co-owners' interest in such patent applications, such co-owners may be able to license their rights to other third parties, including our competitors. In addition, we may need the cooperation of any such co-owners to enforce any patents that issue from such patent applications against third parties, and such cooperation may not be provided to us. We or our licensors are subject to and may also become a party to similar proceedings or priority disputes in Europe or other foreign jurisdictions.

Our registered trademark portfolio currently contains two registered trademarks, specifically ARC nuclease and ARCUS, in the United States. In addition, there are two pending applications in the United States for the marks ELO Life Systems and Precision Breeding Technologies. Finally, our international portfolio contains seven registered trademarks around the world for ARC nuclease and ARCUS.

Licensed intellectual property

Duke University

In April 2006, we exclusively licensed from Duke families of patents and patent applications related to certain meganucleases and methods of making such nucleases owned by Duke. The patent family covered by the Duke License comprises the core patents covering ARCUS described above. See "—License and collaboration agreements—Duke University" above for additional information regarding the Duke License.

Cellectis S.A.

In January 2014, we entered into the Cellectis License, which relates to certain modified I-CreI homing endonuclease patents and patents that had been subject to litigation between us and Cellectis. The patents to which we have rights under the cross-license include at least eight issued patents in each of the United States and Australia, seven issued patents in Europe, two issued patents in Canada and one issued patent in Japan. These patents have standard expiration dates prior to January 29, 2034, subject to potential extensions. See "—License and collaboration agreements—Cellectis S.A." above for additional information regarding the Cellectis License.

Government regulation

The FDA and other regulatory authorities at federal, state, and local levels, as well as in foreign countries, extensively regulate, among other things, the research, development, testing, manufacture, quality control, import, export, safety, effectiveness, labeling, packaging, storage, distribution, record keeping, approval, advertising, promotion, marketing, post-approval monitoring, and post-approval reporting of biological product candidates such as those we are developing. We, along with third-party contractors, will be required to navigate the various preclinical, clinical and commercial approval requirements of the governing regulatory agencies of the countries in which we wish to conduct studies or seek approval or licensure of our product candidates. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources.

U.S. biologics regulation

The process required by the FDA before biologic product candidates may be marketed in the United States generally involves the following:

- completion of preclinical laboratory tests and animal studies performed in accordance with the FDA's Good Laboratory Practice requirements, or GLPs;
- submission to the FDA of an Investigational New Drug application, or IND, which must become effective before clinical trials may begin;
- approval by an IRB or ethics committee at each clinical site before the trial is commenced;
- performance of adequate and well-controlled human clinical trials to establish the safety, purity and potency of the proposed biologic product candidate for its intended purpose;
- preparation of and submission to the FDA of a BLA after completion of all pivotal clinical trials;
- satisfactory completion of an FDA Advisory Committee review, if applicable;
- a determination by the FDA within 60 days of its receipt of a BLA to file the application for review;
- satisfactory completion of an FDA pre-approval inspection of the manufacturing facility or facilities at which the proposed product is produced to assess compliance with cGMP and to assure that the facilities, methods and controls are adequate to preserve the biological product's continued safety, purity and potency, and of selected clinical investigation sites to assess compliance with GCPs; and
- FDA review and approval of the BLA to permit commercial marketing of the product for particular indications for use in the United States.

Prior to beginning the first clinical trial with a product candidate in the United States, we must submit an IND to the FDA. An IND is a request for authorization from the FDA to administer an investigational new drug product to humans. The central focus of an IND submission is on the general investigational plan and the protocol(s) for clinical studies. The IND also includes results of animal and *in vitro* studies assessing the toxicology, pharmacokinetics, pharmacology, and pharmacodynamic characteristics of the product; chemistry, manufacturing, and controls information; and any available human data or literature to support the use of the investigational product. An IND must become effective before human clinical trials may begin. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA, within the 30-day time period, raises safety concerns or questions about the proposed clinical trial. In such a case, the IND may be placed on clinical hold and the IND sponsor and the FDA must resolve any outstanding concerns or questions before the clinical trial can begin. Submission of an IND therefore may or may not result in FDA authorization to begin a clinical trial.

In addition to the submission of an IND to the FDA before initiation of a clinical trial in the United States, certain human clinical trials involving recombinant or synthetic nucleic acid molecules had historically been subject to review by the Recombinant DNA Advisory Committee, or the RAC, of the NIH Office of Biotechnology Activities, or the OBA, pursuant to the NIH Guideline. On August 17, 2018, the NIH issued a notice in the Federal Register and issued a public statement proposing changes to the oversight framework for gene therapy trials, including changes to the applicable NIH Guidelines to modify the roles and responsibilities of the RAC with respect to human clinical trials of gene therapy products, and requesting public comment on its proposed modifications. During the public comment period, which closes October 16, 2018, the NIH has announced that it will no longer accept new human gene transfer protocols for review as a part of the protocol registration process or convene the RAC to review individual clinical protocols. These trials will remain subject to the FDA's oversight and other clinical trial regulations, and oversight at the local level will continue as set forth in the NIH Guidelines. Specifically, under the NIH Guidelines, supervision of human gene transfer trials includes evaluation and assessment by an IBC, a local institutional committee that reviews and oversees research utilizing recombinant or synthetic nucleic acid molecules at that institution. The IBC assesses the safety of the research and identifies any potential risk to public health or the environment, and such review may result in some delay before initiation of a clinical trial. While the NIH Guidelines are not mandatory unless the research in question is being conducted at or sponsored by institutions receiving NIH funding of recombinant or synthetic nucleic acid molecule research, many companies and other institutions not otherwise subject to the NIH Guidelines voluntarily follow them.

Clinical trials involve the administration of the investigational product to human subjects under the supervision of qualified investigators in accordance with GCPs, which include the requirement that all research subjects provide their informed consent for their participation in any clinical study. Clinical trials are conducted under protocols detailing, among other things, the objectives of the study, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated. A separate submission to the existing IND must be made for each successive clinical trial conducted during product development and for any subsequent protocol amendments. Furthermore, an independent IRB for each site proposing to conduct the clinical trial must review and approve the plan for any clinical trial and its informed consent form before the clinical trial begins at that site, and must monitor the study until completed. Regulatory authorities, the IRB or the sponsor may suspend a clinical trial at any time on various grounds, including a finding that the subjects are being exposed to an unacceptable health risk or that the trial is unlikely to meet its stated objectives. Some studies also include oversight by an independent group of qualified experts organized by the clinical study sponsor, known as a data safety monitoring board, which provides authorization for whether or not a study may move forward at designated check points based on access to certain data from the study and may halt the clinical trial if it determines that there is an unacceptable safety risk for subjects or other grounds, such as no demonstration of efficacy. There are also requirements governing the reporting of ongoing clinical studies and clinical study results to public registries.

For purposes of BLA approval, human clinical trials are typically conducted in three sequential phases that may overlap or be combined:

- Phase 1—The investigational product is initially introduced into healthy human subjects or patients with the target disease or condition. These studies are designed to test the safety, dosage tolerance, absorption, metabolism and distribution of the investigational product in humans, the side effects associated with increasing doses, and, if possible, to gain early evidence on effectiveness.
- Phase 2—The investigational product is administered to a limited patient population with a specified disease or condition to evaluate the preliminary efficacy, optimal dosages and dosing schedule and to identify possible adverse side effects and safety risks. Multiple Phase 2 clinical trials may be conducted to obtain information prior to beginning larger and more expensive Phase 3 clinical trials.

- Phase 3—The investigational product is administered to an expanded patient population to further evaluate dosage, to provide statistically significant evidence of clinical efficacy and to further test for safety, generally at multiple geographically dispersed clinical trial sites. These clinical trials are intended to establish the overall risk/benefit ratio of the investigational product and to provide an adequate basis for product approval.
- Phase 4—In some cases, the FDA may require, or companies may voluntarily pursue, additional clinical trials after a product is approved to gain more information about the product. These so-called Phase 4 studies may be made a condition to approval of the BLA.

Concurrent with clinical trials, companies may complete additional animal studies and develop additional information about the biological characteristics of the product candidate, and must finalize a process for manufacturing the product in commercial quantities in accordance with cGMP. The manufacturing process must be capable of consistently producing quality batches of the product candidate and, among other things, must develop methods for testing the identity, strength, quality and purity of the final product, or for biologics, the safety, purity and potency. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the product candidate does not undergo unacceptable deterioration over its shelf life.

BLA submission and review by the FDA

Assuming successful completion of all required testing in accordance with all applicable regulatory requirements, the results of product development, nonclinical studies and clinical trials are submitted to the FDA as part of a BLA requesting approval to market the product for one or more indications. The BLA must include all relevant data available from pertinent preclinical and clinical studies, including negative or ambiguous results as well as positive findings, together with detailed information relating to the product's chemistry, manufacturing, controls, and proposed labeling, among other things. Data can come from company-sponsored clinical studies intended to test the safety and effectiveness of a use of the product, or from a number of alternative sources, including studies initiated by investigators. The submission of a BLA requires payment of a substantial user fee to FDA, and the sponsor of an approved BLA is also subject to an annual program fee. These fees are typically increased annually. A waiver of user fees may be obtained under certain limited circumstances. Additionally, no user fees are assessed on BLAs for products designated as orphan drugs, unless the product also includes a non-orphan indication.

Once a BLA has been submitted, the FDA's goal is to review standard applications within ten months after it accepts the application for filing, or, if the application qualifies for priority review, six months after the FDA accepts the application for filing. Priority review designation will direct overall attention and resources to the evaluation of applications for products that, if approved, would be significant improvements in the safety or effectiveness of the treatment, diagnosis, or prevention of serious conditions. In both standard and priority reviews, the review process is often significantly extended by FDA requests for additional information or clarification. The FDA reviews a BLA to determine, among other things, whether a product is safe, pure and potent and the facility in which it is manufactured, processed, packed, or held meets standards designed to assure the product's continued safety, purity and potency. The FDA may convene an advisory committee to provide clinical insight on application review questions. Before approving a BLA, the FDA will typically inspect the facility or facilities where the product is manufactured. The FDA will not approve an application unless it determines that the manufacturing processes and facilities are in compliance with cGMP and adequate to assure consistent production of the product within required specifications. Additionally, before approving a BLA, the FDA will typically inspect one or more clinical sites to assure compliance with GCP. If the FDA determines that the application, manufacturing process or manufacturing facilities are not acceptable, it will

outline the deficiencies in the submission and often will request additional testing or information. Notwithstanding the submission of any requested additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval.

After the FDA evaluates a BLA and conducts inspections of manufacturing facilities where the investigational product and/or its drug substance will be produced, the FDA may issue an approval letter or a Complete Response Letter. An approval letter authorizes commercial marketing of the product with specific prescribing information for specific indications. A Complete Response Letter will describe all of the deficiencies that the FDA has identified in the BLA, except that where the FDA determines that the data supporting the application are inadequate to support approval, the FDA may issue the Complete Response Letter without first conducting required inspections, testing submitted product lots, and/or reviewing proposed labeling. In issuing the Complete Response Letter, the FDA may recommend actions that the applicant might take to place the BLA in condition for approval, including requests for additional information or clarification. The FDA may delay or refuse approval of a BLA if applicable regulatory criteria are not satisfied, require additional testing or information and/or require post-marketing testing and surveillance to monitor safety or efficacy of a product.

If regulatory approval of a product is granted, such approval will be granted for particular indications and may entail limitations on the indicated uses for which such product may be marketed. For example, the FDA may approve the BLA with a REMS to ensure the benefits of the product outweigh its risks. A REMS is a safety strategy to manage a known or potential serious risk associated with a medicine and to enable patients to have continued access to such medicines by managing their safe use, and could include medication guides, physician communication plans, or elements to assure safe use, such as restricted distribution methods, patient registries, and other risk minimization tools. The FDA also may condition approval on, among other things, changes to proposed labeling or the development of adequate controls and specifications. Once approved, the FDA may withdraw the product approval if compliance with pre- and post-marketing requirements is not maintained or if problems occur after the product reaches the marketplace. The FDA may require one or more Phase IV post-market studies and surveillance to further assess and monitor the product's safety and effectiveness after commercialization, and may limit further marketing of the product based on the results of these post-marketing studies. In addition, new government requirements, including those resulting from new legislation, may be established, or the FDA's policies may change, which could impact the timeline for regulatory approval or otherwise impact ongoing development programs. For example, in December 2016, the 21st Century Cures Act was signed into law. The Act is intended, among other things, to modernize the regulation of drugs and biologics and to spur innovation.

Expedited development and review programs

A sponsor may seek approval of its product candidate under programs designed to accelerate FDA's review and approval of new drugs and biological products that meet certain criteria. Specifically, new drugs and biological products are eligible for fast track designation if they are intended to treat a serious or life-threatening disease or condition and demonstrate the potential to address unmet medical needs for the disease or condition. For a fast track product, the FDA may consider sections of the BLA for review on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the application, the FDA agrees to accept sections of the application and determines that the schedule is acceptable and the sponsor pays any required user fees upon submission of the first section of the application. A fast track designated product candidate may also qualify for priority review, under which the FDA sets the target date for FDA action on the BLA at six months after the FDA accepts the application for filing. Priority review is granted when there is evidence that the proposed product would be a significant improvement in the safety or effectiveness of the treatment, diagnosis, or prevention of a serious disease or condition. If criteria are not met for priority review, the application is subject to the standard FDA review period of 10 months after FDA accepts

the application for filing. Priority review designation does not change the scientific/medical standard for approval or the quality of evidence necessary to support approval.

Under the accelerated approval program, the FDA may approve a BLA on the basis of either a surrogate endpoint that is reasonably likely to predict clinical benefit, or on a clinical endpoint that can be measured earlier than irreversible morbidity or mortality, that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity, or prevalence of the condition and the availability or lack of alternative treatments. Post-marketing studies or completion of ongoing studies after marketing approval are generally required to verify the biologic's clinical benefit in relationship to the surrogate endpoint or ultimate outcome in relationship to the clinical benefit. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials, which could adversely impact the timing of the commercial launch of the product. FDA may withdraw approval of a drug or indication approved under accelerated approval if, for example, the confirmatory trial fails to verify the predicted clinical benefit of the product.

In addition, the Food and Drug Administration Safety and Innovation Act, or the FDASIA, which was enacted and signed into law in 2012, established the breakthrough therapy designation. A sponsor may seek FDA designation of its product candidate as a breakthrough therapy if the product candidate is intended, alone or in combination with one or more other drugs or biologics, to treat a serious or life-threatening disease or condition and preliminary clinical evidence indicates that the therapy may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. If the FDA designates a breakthrough therapy, it may take actions appropriate to expedite the development and review of the application, which may include holding meetings with the sponsor and the review team throughout the development of the therapy; providing timely advice to, and interactive communication with, the sponsor regarding the development of the drug to ensure that the development program to gather the nonclinical and clinical data necessary for approval is as efficient as practicable; involving senior managers and experienced review staff, as appropriate, in a collaborative, cross-disciplinary review; assigning a cross-disciplinary project lead for the FDA review team to facilitate an efficient review of the development program and to serve as a scientific liaison between the review team and the sponsor; and considering alternative clinical trial designs when scientifically appropriate, which may result in smaller trials or more efficient trials that require less time to complete and may minimize the number of patients exposed to a potentially less efficacious treatment. Breakthrough therapy designation comes with all of the benefits of fast track designation, which means that the sponsor may file sections of the BLA for review on a rolling basis if certain conditions are satisfied, including an agreement with the FDA on the proposed schedule for submission of portions of the application and the payment of applicable user fees before the FDA may initiate a review.

Fast Track designation, priority review and breakthrough therapy designation do not change the standards for approval but may expedite the development or approval process. Even if a product qualifies for one or more of these programs, the FDA may later decide that the product no longer meets the conditions for qualification or decide that the time period for FDA review or approval will not be shortened.

Orphan drug designation and exclusivity

Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biologic intended to treat a rare disease or condition, defined as a disease or condition with a patient population of fewer than 200,000 individuals in the United States, or a patient population greater than 200,000 individuals in the United States and when there is no reasonable expectation that the cost of developing and making available the drug or biologic in the United States will be recovered from sales in the United States for that drug or biologic. Orphan

drug designation must be requested before submitting a BLA. After the FDA grants orphan drug designation, the generic identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA.
If a product that has orphan drug designation subsequently receives the first FDA approval for a particular active ingredient for the disease for which it has such designation, the product is entitled to orphan product exclusivity, which means that the FDA may not approve any other applications, including a full BLA, to market the same biologic for the same indication for seven years, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity or if the FDA finds that the holder of the orphan drug exclusivity has not shown that it can assure the availability of sufficient quantities of the orphan drug to meet the needs of patients with the disease or condition for which the drug was designated. Orphan drug exclusivity does not prevent the FDA from approving a different drug or biologic for the same disease or condition, or the same drug or biologic for a different disease or condition. Among the other benefits of orphan drug designation are tax credits for certain research and a waiver of the BLA application user fee.

A designated orphan drug many not receive orphan drug exclusivity if it is approved for a use that is broader than the indication for which it received orphan designation. In addition, orphan drug exclusive marketing rights in the United States may be lost if the FDA later determines that the request for designation was materially defective or, as noted above, if the second applicant demonstrates that its product is clinically superior to the approved product with orphan exclusivity or the manufacturer of the approved product is unable to assure sufficient quantities of the product to meet the needs of patients with the rare disease or condition. We plan to seek orphan drug designation for some or all of our product candidates in specific orphan indications in which there is a medically plausible basis for the use of these products.

Post-approval requirements

Any products manufactured or distributed by us pursuant to FDA approvals are subject to pervasive and continuing regulation by the FDA, including, among other things, requirements relating to record-keeping, reporting of adverse experiences, periodic reporting, product sampling and distribution, and advertising and promotion of the product. After approval, most changes to the approved product, such as adding new indications or other labeling claims, are subject to prior FDA review and approval. There also are continuing, annual program fees for any marketed products. Biologic manufacturers and their subcontractors are required to register their establishments with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMP, which impose certain procedural and documentation requirements upon us and our third-party manufacturers. Changes to the manufacturing process are strictly regulated, and, depending on the significance of the change, may require prior FDA approval before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and impose reporting requirements upon us and any third-party manufacturers that we may decide to use. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain compliance with cGMP and other aspects of regulatory compliance.

The FDA may withdraw approval if compliance with regulatory requirements and standards is not maintained or if problems occur after the product reaches the market. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with manufacturing processes, or failure to comply with regulatory requirements, may result in revisions to the approved labeling to add new safety information; imposition of post-market studies or clinical studies to assess new safety risks; or imposition of distribution restrictions or other restrictions under a REMS program. Other potential consequences include, among other things:

- restrictions on the marketing or manufacturing of the product, complete withdrawal of the product from the market or product recalls;

- fines, warning letters or holds on post-approval clinical studies;
- refusal of the FDA to approve pending applications or supplements to approved applications, or suspension or revocation of product license approvals;
- product seizure or detention, or refusal to permit the import or export of products;
- consent decrees, corporate integrity agreements, debarment or exclusion from federal healthcare programs;
- mandated modification of promotional materials and labeling and the issuance of corrective information;
- the issuance of safety alerts, Dear Healthcare Provider letters, press releases and other communications containing warnings or other safety information about the product; or
- injunctions or the imposition of civil or criminal penalties.

The FDA closely regulates the marketing, labeling, advertising and promotion of biologics. A company can make only those claims relating to safety and efficacy, purity and potency that are approved by the FDA and in accordance with the provisions of the approved label. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses. Failure to comply with these requirements can result in, among other things, adverse publicity, warning letters, corrective advertising and potential civil and criminal penalties. Physicians may prescribe legally available products for uses that are not described in the product's labeling and that differ from those tested by us and approved by the FDA. Such off-label uses are common across medical specialties. Physicians may believe that such off-label uses are the best treatment for many patients in varied circumstances. The FDA does not regulate the behavior of physicians in their choice of treatments. The FDA does, however, restrict manufacturer's communications on the subject of off-label use of their products.

Biosimilars and exclusivity

The Affordable Care Act, signed into law in 2010, includes a subtitle called the BPCIA, which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-licensed reference biological product. The FDA has issued several guidance documents outlining an approach to review and approval of biosimilars.

Biosimilarity, which requires that there be no clinically meaningful differences between the biological product and the reference product in terms of safety, purity, and potency, can be shown through analytical studies, animal studies, and a clinical study or studies. Interchangeability requires that a product is biosimilar to the reference product and the product must demonstrate that it can be expected to produce the same clinical results as the reference product in any given patient and, for products that are administered multiple times to an individual, the biologic and the reference biologic may be alternated or switched after one has been previously administered without increasing safety risks or risks of diminished efficacy relative to exclusive use of the reference biologic. However, complexities associated with the larger, and often more complex, structures of biological products, as well as the processes by which such products are manufactured, pose significant hurdles to implementation of the abbreviated approval pathway that are still being worked out by the FDA.

Under the BPCIA, an application for a biosimilar product may not be submitted to the FDA until four years following the date that the reference product was first licensed by the FDA. In addition, the approval of a biosimilar product may not be made effective by the FDA until 12 years from the date on which the reference product was first licensed. During this 12-year period of exclusivity, another company may still market a competing version of the reference product if the FDA approves a full BLA for the competing product containing that applicant's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate

the safety, purity and potency of its product. The BPCIA also created certain exclusivity periods for biosimilars approved as interchangeable products. At this juncture, it is unclear whether products deemed “interchangeable” by the FDA will, in fact, be readily substituted by pharmacies, which are governed by state pharmacy law.

A biological product can also obtain pediatric market exclusivity in the United States. Pediatric exclusivity, if granted, adds six months to existing exclusivity periods and patent terms. This six-month exclusivity, which runs from the end of other exclusivity protection or patent term, may be granted based on the voluntary completion of a pediatric study in accordance with an FDA-issued “Written Request” for such a study.

The BPCIA is complex and continues to be interpreted and implemented by the FDA. In addition, government proposals have sought to reduce the 12-year reference product exclusivity period. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. As a result, the ultimate impact, implementation, and impact of the BPCIA is subject to significant uncertainty.

Genetically engineered food products

In the United States, the FDA and the USDA are primarily responsible for overseeing food regulation and safety, although many other federal agencies also play a role in food regulation.

USDA has jurisdiction over certain genetically engineered crops through the Animal and Plant Health Inspection Services, or APHIS. Under the Plant Protection Act and APHIS’ Part 340 regulations, USDA requires anyone who wishes to import, transport interstate, or release into the environment a “regulated article” to apply for a permit or, in some cases, notify APHIS that the introduction will be made. Regulated articles are defined as “any organism which has been altered or produced through genetic engineering … which USDA determines is a plant pest or has reason to believe is a plant pest.” Regulated articles may be subject to extensive regulation, including both permitting requirements and inspections. However, APHIS may make a determination of nonregulated status for a product following the submission of a petition requesting such a determination. The petition process can be a multi-year process that varies based on a number of factors, including APHIS’s familiarity with similar products, the type and scope of the environmental review conducted, and the number and types of public comments received. APHIS conducts a comprehensive science-based review of the petition to assess, among other things, plant pest risk, environmental considerations pursuant to the National Environmental Policy Act of 1969, or NEPA, and any potential impact on endangered species. If, upon the completion of the review, APHIS grants the petition, the product is no longer deemed a “regulated article” and the petitioner may commercialize the product, subject to any conditions set forth in the decision. In January 2017, APHIS proposed significant amendments to its Part 340 regulatory framework that would, among other things, clarify the types of genetically engineered plants subject to regulation thereunder. In November 2017, however, APHIS withdrew its proposed rule and stated that it would “begin a fresh stakeholder engagement aimed at exploring alternative policy approaches.” That process appears to remain ongoing.

On May 4, 2018, the USDA issued a proposed rule implementing the National Bioengineered Food Disclosure Standard, with a proposed compliance date of January 1, 2020. Under this proposed rule, the label of a bioengineered, or BE, food must include a disclosure that the food is a BE food or contains a BE ingredient, with certain exceptions. This proposed rule defines BE food as “a food that contains genetic material that was has been modified through in vitro recombinant deoxyribonucleic acid, or DNA, techniques and for which the modification could not otherwise be obtained through conventional breeding or found in nature,” except in the case of an incidental additive present in food at an insignificant level and that does not have any technical or functional effect in the food. The USDA’s proposed rule may change significantly prior to being finalized.

The FDA’s oversight of food safety and security is primarily carried out by the Center for Food Safety and Applied Nutrition. To execute its responsibilities, the FDA conducts inspections and collects and analyzes

product samples. Foods are typically not subject to premarket review and approval requirements, with limited exceptions, such as the requirement for premarket review and approval of food additives. Under Section 201(s) and 409 of the FDCA, any substance that is reasonably expected to become a component of food is considered a “food additive” that is subject to premarket approval by the FDA, unless it is already subject to a food additive regulation. Ingredients that are GRAS are exempt from the definition of food additive and from the premarket approval requirements. Under section 201(s), and FDA’s implementing regulations, the use of a food substance may be GRAS either through a determination by qualified experts or, for a substance used in food before 1958, through experience based on common use in food.

Manufacturers of GRAS substances may voluntarily provide the FDA with a notification of GRAS determination, which includes, among other things, a description of the substance, the applicable conditions of use, the dietary exposure and an explanation of how the substance was determined to be safe for the intended use. Upon review of such a notification, the FDA may respond with a “no questions” letter stating that while it has not made its own GRAS determination, it has no questions at the time regarding the applicant’s own GRAS determination. Alternatively, manufacturers may self-affirm that a given substance is GRAS without the voluntary FDA notification. A company may market a new food ingredient based on its independent determination that the substance is GRAS; however, the FDA can disagree with this determination and take enforcement action.

The FDA regulates foods made with genetically modified organisms under the approach summarized in its 1992 “Statement of Policy: Foods Derived from New Plant Varieties.” Under this policy, updated in 2017, the FDA regulates foods derived from genetically modified plant varieties consistent with the framework for non-genetically modified foods. Under this framework, the FDA offers a voluntary consultation process to determine whether a food derived from a genetically modified plant variety raises any safety or other regulatory issues, such as whether any substance in the food from the plant may require premarket approval as a food additive.

Other U.S. healthcare laws and compliance requirements

In the United States, our activities are potentially subject to regulation under various federal and state healthcare laws including, among others, the federal Anti-Kickback Statute, the federal False Claims Act and HIPAA.

The U.S. federal Anti-Kickback Statute prohibits, among other things, any person or entity, from knowingly and willfully offering, paying, soliciting or receiving any remuneration, directly or indirectly, overtly or covertly, in cash or in kind, to induce or in return for purchasing, leasing, ordering or arranging for the purchase, lease or order of any item or service reimbursable under Medicare, Medicaid or other federal healthcare programs. The term remuneration has been interpreted broadly to include anything of value. A person does not need to have knowledge of the statute or specific intent to violate it to have committed a violation. In addition, the government may assert that a claim including items or services resulting from a violation of the U.S. federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act.

The U.S. federal civil and criminal false claims laws and civil monetary penalties laws, including the civil False Claims Act, which can be enforced through civil whistleblower or qui tam actions, prohibits, among other things, any person or entity from knowingly presenting, or causing to be presented, a false claim for payment to, or approval by, the federal government or knowingly making, using, or causing to be made or used a false record or statement material to a false or fraudulent claim to the federal government, or from knowingly making a false statement to avoid, decrease or conceal an obligation to pay money to the U.S. government.

The U.S. Health Insurance Portability and Accountability Act of 1996, or HIPAA, created additional federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud

or to obtain, by means of false or fraudulent pretenses, representations or promises, any money or property owned by, or under the control or custody of, any healthcare benefit program, including private third-party payors and knowingly and willfully falsifying, concealing or covering up by trick, scheme or device, a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services. Similar to the U.S. federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation.

HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, or HITECH, and their implementing regulations, impose obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information without appropriate authorization by covered entities subject to the rule, such as health plans, healthcare clearinghouses and certain healthcare providers, as well as their business associates that perform certain services for or on their behalf involving the use or disclosure of individually identifiable health information.

Additionally, the federal Physician Payments Sunshine Act, and its implementing regulations, require that certain manufacturers of drugs, devices, biological and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to report annually to CMS information related to certain payments or other transfers of value made or distributed to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, or to entities or individuals at the request of, or designated on behalf of, the physicians and teaching hospitals and to report annually to CMS certain ownership and investment interests held by physicians and their immediate family members.

Moreover, analogous state and non-U.S. laws and regulations may apply to our activities, such as state anti-kickback and false claims laws, which may apply to our business practices, including, but not limited to, research, distribution, sales and marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers, or by the patients themselves, state laws that require pharmaceutical and device companies to comply with the industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the U.S. government, or otherwise restrict payments that may be made to healthcare providers and other potential referral sources, state laws and regulations that require manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures and pricing information, state and local laws which require the registration of pharmaceutical sales representatives and state and non-U.S. laws, such as the EU General Data Protection Regulation 2016/679, governing the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Efforts to ensure that current and future business arrangements with third parties complies with applicable healthcare laws and regulations involves substantial costs. If a business is found to be in violation of any of these or any other health regulatory laws that may apply to it, it may be subject to significant penalties, including the imposition of significant civil, criminal and administrative penalties, damages, monetary fines, disgorgement, individual imprisonment, possible exclusion from participation in Medicare, Medicaid and other U.S. healthcare programs, additional reporting requirements and oversight if subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, contractual damages, reputational harm, diminished profits and future earnings, and curtailment or restructuring of operations.

Coverage, pricing and reimbursement

Significant uncertainty exists as to the coverage and reimbursement status for newly approved therapeutics. In the United States and markets in other countries, sales of any products for which we receive regulatory approval for commercial sale will depend, in part, on the extent to which third-party payors provide coverage, and establish adequate reimbursement levels for such products. In the United States, third-party payors include federal and state healthcare programs, private managed care providers, health insurers and other organizations. Third-party payors may limit coverage to specific products on an approved list, or also known as a formulary, which might not include all of the FDA-approved products for a particular indication. A payor's decision to provide coverage for a product does not imply that an adequate reimbursement rate will be approved. Further, one payor's determination to provide coverage for a product does not assure that other payors will also provide coverage for the product. Moreover, the coverage provided may be more limited than the purposes for which the product is approved by the FDA. It is also possible that a third-party payor may consider a product as substitutable and only offer to reimburse patients for the less expensive product. Adequate third-party payor reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in product development. Coverage policies and third-party payor reimbursement rates may change at any time. Even if favorable coverage and reimbursement status is attained for one or more products for which we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Healthcare reform

In the United States and some foreign jurisdictions, there have been, and continue to be, several legislative and regulatory changes and proposed changes regarding the healthcare system that could prevent or delay marketing approval of product candidates, restrict or regulate post-approval activities, and affect the ability to profitably sell product candidates for which marketing approval is obtained. Among policy makers and payors in the United States and elsewhere, there is significant interest in promoting changes in healthcare systems with the stated goals of containing healthcare costs, improving quality and/or expanding access. The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, collectively the Affordable Care Act, enacted in March 2010, has substantially changed healthcare financing and delivery by both governmental and private insurers. Among other things the Affordable Care Act included the following provisions:

- an annual, nondeductible fee on any entity that manufactures or imports certain specified branded prescription drugs and biologic agents apportioned among these entities according to their market share in some government healthcare programs;
- an increase in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program;
- a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% point-of-sale discounts, which through subsequent legislative amendments, will be increased to 70%, starting in 2019, off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturers' outpatient drugs to be covered under Medicare Part D;
- extension of manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations;
- expansion of eligibility criteria for Medicaid programs;

- expansion of the entities eligible for discounts under the 340B Drug Discount Program;
- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research;
- a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted, or injected; and
- a licensure framework for follow on biologic products.

Some of the provisions of the Affordable Care Act have yet to be implemented, and there have been legal and political challenges to certain aspects of the Affordable Care Act. Since January 2017, President Trump has signed two executive orders and other directives designed to delay, circumvent, or loosen certain requirements mandated by the Affordable Care Act. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the Affordable Care Act. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the Affordable Care Act have been signed into law. The Tax Cuts and Jobs Act of 2017 includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the Affordable Care Act on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the “individual mandate.” Additionally, on January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain Affordable Care Act-mandated fees, including the so-called “Cadillac” tax on certain high cost employer-sponsored insurance plans, the annual fee imposed on certain health insurance providers based on market share. Further, the Bipartisan Budget Act of 2018, among other things, amends the Affordable Care Act, effective January 1, 2019, to close the coverage gap in most Medicare drug plans, commonly referred to as the “donut hole.” More recently, in July 2018, CMS published a final rule permitting further collections and payments to and from certain Affordable Care Act qualified health plans and health insurance issuers under the Affordable Care Act risk adjustment program in response to the outcome of federal district court litigation regarding the method CMS uses to determine this risk adjustment.

In addition, other legislative changes have been proposed and adopted since the Affordable Care Act was enacted. On August 2, 2011, the Budget Control Act of 2011 was signed into law, which, among other things, created the Joint Select Committee on Deficit Reduction to recommend to Congress proposals for spending reductions. The Joint Select Committee did not achieve a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, triggering the legislation’s automatic reduction to several government programs. This includes reductions to Medicare payments to providers of 2% per fiscal year, which went into effect on April 1, 2013 and, due to subsequent legislative amendments to the statute, including the BBA, will remain in effect through 2027 unless additional Congressional action is taken. On January 2, 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, reduced Medicare payments to several providers, including hospitals, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

Further, there has been heightened governmental scrutiny recently over pharmaceutical pricing practices in light of the rising cost of prescription drugs and biologics. Such scrutiny has resulted in several recent Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for pharmaceutical products, some of which are included in the Trump administration’s budget proposal for fiscal year 2019. Additionally, the Trump administration released a “Blueprint” to lower drug prices and reduce out of pocket costs of drugs that contains additional proposals to increase manufacturer competition, increase the negotiating power of certain federal

healthcare programs, incentivize manufacturers to lower the list price of their products and reduce the out of pocket costs of drug products paid by consumers. The U.S. Department of Health and Human Services has begun the process of soliciting feedback on some of these measures and, at the same, is immediately implementing others under its existing authority. Although a number of these, and other potential, proposed measures will require authorization through additional legislation to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical product and medical device pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. In addition, regional healthcare authorities and individual hospitals are increasingly using bidding procedures to determine what pharmaceutical products and medical devices to purchase and which suppliers will be included in their prescription drug and other healthcare programs.

Additionally, on May 30, 2018, the Right to Try Act was signed into law. The law, among other things, provides a federal framework for certain patients to access certain investigational new drug products that have completed a Phase 1 clinical trial and that are undergoing investigation for FDA approval. Under certain circumstances, eligible patients can seek treatment without enrolling in clinical trials and without obtaining FDA permission under the FDA expanded access program. There is no obligation for a drug manufacturer to make its drug products available to eligible patients as a result of the Right to Try Act.

Facilities

We currently occupy approximately 49,000 square feet of office and laboratory space at our corporate headquarters in Durham, North Carolina under a lease that expires in 2024. This lease provides us the option to lease an additional 20,000 square feet of office space. We also occupy approximately 15,500 square feet of laboratory and office space in Research Triangle Park, North Carolina under a lease that expires in 2025, and we occupy approximately 17,300 square feet of laboratory and office space in Research Triangle Park, North Carolina under a lease that expires in 2026. We believe that our facilities are sufficient to meet our current needs and that suitable additional space will be available as and when needed.

Employees

As of September 30, 2018, we had 115 full-time Precisioneers, over half of whom have advanced degrees, including 42 with Ph.D. degrees. Of these full-time employees, 80 are engaged in research and development activities. None of our employees is represented by a labor union or covered by a collective bargaining agreement. We consider our relationships with our employees to be good.

Legal proceedings

We are not currently party to any material legal proceedings.

Management

Executive officers and directors

The following table sets forth the name, age and position of each of our executive officers and directors as of September 30, 2018.

Name	Age	Position
Executive officers		
Matthew Kane	42	President, Chief Executive Officer and Director
Derek Jantz, Ph.D.	43	Chief Scientific Officer and Director
Abid Ansari	40	Vice President, Finance and Operations
Michael Dombeck	42	Vice President, Business Development
Fayaz Khazi, Ph.D.	46	Chief Executive Officer, Elo Life Systems
Michael Nicholson, Ph.D.	44	Chief People Officer
Jeff Smith, Ph.D.	45	Chief Technology Officer
David Thomson, Ph.D.	58	Chief Development Officer
Non-employee directors		
Robert Adelman, M.D.	55	Director
Tony Yao, M.D., Ph.D.	46	Director

(1) Member of the audit committee.

(2) Member of the compensation committee.

(3) Member of the nominating and corporate governance committee.

Executive officers

Matthew Kane, a co-founder of Precision, has served as our President and Chief Executive Officer and a director since our inception in 2006. Mr. Kane has nearly 20 years of experience in the life sciences industry, most of which has been spent specifically working in genome editing. Prior to co-founding Precision, Mr. Kane was with Suros Surgical Systems. Mr. Kane received a B.S. in mechanical engineering and an M.S. in biomedical engineering from the Rose-Hulman Institute of Technology and an M.B.A. from Duke University.

We believe that Mr. Kane is qualified to serve on our board of directors because of the perspective and experience he provides as one of our founders and as our President and Chief Executive Officer, as well as his many years of experience within the life sciences and agricultural biotechnology industries.

Derek Jantz, *Ph.D.*, a co-founder of Precision, has been our Chief Scientific Officer since August 2013 and has served on our board of directors since January 2006. He previously served as our Vice President of Scientific Development from our inception to August 2013. Dr. Jantz is the co-inventor of several of our foundational patents and other intellectual property. As a protein engineer, he was an early developer of zinc finger technology and has spent most of his research career designing proteins for genome editing applications. Dr. Jantz received a B.A. in biology from the University of Colorado at Boulder and a Ph.D. in biophysics from the Johns Hopkins University School of Medicine.

We believe that Dr. Jantz's extensive experience in genome editing and as an inventor of ARCUS, in addition to his perspective as one of our founders and senior executives, qualifies him to serve on our board of directors.

Abid Ansari has served as our Vice President, Finance & Operations since July 2016. Prior to joining us, Mr. Ansari served as Senior Director, Deal Finance and M&A from November 2013 to July 2016 and Senior Director, Head of Portfolio Analysis Group from September 2011 to November 2013 for GlaxoSmithKline plc. Before that, he served for five years in commercial and capital finance roles at MedImmune, LLC and three years as a plant controller at Uniqema (previously a division of Imperial Chemical Industries Plc). Mr. Ansari received a B.S. in chemical engineering and an M.B.A. from Purdue University. Mr. Ansari is also a Certified Public Accountant.

Michael Dombeck has served as our Vice President, Business Development since April 2015. Prior to joining us, Mr. Dombeck was a Director in the R&D Strategy and Portfolio Management group of GlaxoSmithKline plc beginning in April 2012 and a manager in the Portfolio and Business Analysis group from September 2009 to April 2012. Mr. Dombeck's prior experience also includes market research and portfolio planning for Talecris Biotherapeutics, business development for DarPharma, Inc., business development and corporate strategy consulting for Campbell Alliance and co-founding Cempra Pharmaceuticals. Mr. Dombeck received a B.S., M.B.A. and Master of Public Policy from Duke University.

Fayaz Khazi, *Ph.D.*, has served as the CEO of our food-focused subsidiary, Elo Life Systems, since May 2018 and, prior to that, served as President of Elo Life Systems beginning in May 2017. From May 2014 to April 2017, Dr. Khazi served as the CEO of Key Gene USA. Dr. Khazi also held several executive leadership positions at Intrexon Corporation directing translation programs in the food, human health and agricultural biotechnology sectors, including serving as Vice President, Business Analytics and Strategy from January 2012 to January 2014, and also serving as Intrexon's founding Director of Translational Medicine. Dr. Khazi received a B.Sc. from the University of Agricultural Sciences, Bangalore, and a Ph.D. in biological sciences from Auburn University. He trained as a Howard Hughes Medical Institute post-doctoral fellow and a senior researcher at the Children's Hospital of Philadelphia, where he studied the genotoxicity of gene therapy vectors and developed *in vivo* genome-editing technologies to treat genetic diseases.

Michael Nicholson, Ph.D., has held a number of leadership positions with us, and has served as Chief People Officer since January 2018. Prior to that, Dr. Nicholson served as our Vice President of Research and Development from November 2016 to December 2017, Executive Director of Scientific Operations from June 2015 to October 2016 and Director of Cell Biology from July 2008 to May 2015. Dr. Nicholson received a B.S. in chemistry from the College at Brockport, State University of New York and a Ph.D. in molecular biology and genetics from the Johns Hopkins University School of Medicine.

Jeff Smith, *Ph.D.*, a co-founder of Precision, has served as our Chief Technology Officer since August 2013 and, before that, served as our Chief Science Officer beginning at our inception. Dr. Smith received his graduate degree from the Johns Hopkins University School of Medicine while developing and characterizing custom nucleases for genome engineering. Continuing his work in protein engineering first as a postdoctoral fellow and then as a senior research associate at Duke University Medical Center, Dr. Smith helped create the foundation for ARCUS. Dr. Smith received a B.A. in biology and chemistry from Franklin & Marshall College and a Ph.D. in biochemistry, cellular and molecular biology from the Johns Hopkins University School of Medicine.

David Thomson, Ph.D., has served as our Chief Development Officer since June 2017. Prior to joining us, he served as Senior Vice President Research and Nonclinical Development for Shire plc beginning in May 2016 until May 2017 where he was responsible for the strategy and operational direction of the Global Research and Nonclinical Development Organization, including transitioning programs from research into clinical development and support of programs through commercialization. Prior to that, he served as Senior Vice

President and Global Head, Research and Development Operations for Shire from February 2015 to May 2016. From May 2014 to January 2015, Dr. Thomson served as the Director of the Biomanufacturing Research Institute and Technology Enterprise and a Professor in the Department of Pharmaceutical Sciences of North Carolina Central University. From September 2012 to April 2014, Dr. Thomson served as Vice President, Shire Human Genetic Therapies and later Senior Vice President, Global Head of Research and Nonclinical Development for Shire plc. He received a B.Sc. in chemistry from the University of Strathclyde and a Ph.D. in organic chemistry from the University of Toronto, and he completed post-doctoral work at Yale University.

Non-employee directors

Robert Adelman, M.D., has served on our board of directors since April 2015. Since 2011, Dr. Adelman has been Managing Partner of venBio Partners LLC, a venture capital firm Dr. Adelman founded in 2011. Dr. Adelman currently serves on the board of directors of Metacrine, Inc., ALX Oncology and TP Therapeutics, Inc. Prior to founding venBio, Dr. Adelman had a seven-year tenure as a Private Equity Partner at OrbiMed Advisors LLC. Dr. Adelman has also previously co-founded a number of biotechnology companies and practiced surgery in New York and New Jersey. Dr. Adelman received a B.A. in biochemistry from the University of California at Berkeley and a M.D. from Yale University, and he completed his residency at Cornell University Medical Center.

We believe that Dr. Adelman's medical background and experience in the venture capital industry, particularly with biotechnology and pharmaceutical companies, qualify him to serve as a member of our board of directors.

Tony Yao, M.D., Ph.D., has served on our board of directors since May 2018. Since April 2012, Dr. Yao has served as a portfolio manager at ArrowMark Partners, where he leads the healthcare team and manages the healthcare portfolio. Dr. Yao currently serves on the board of directors of 4D Molecular Therapeutics, Inc. and NexImmune, Inc. Dr. Yao began his investment career in February 2002 as an analyst and later an assistant portfolio manager at Janus Capital Group. Dr. Yao received a B.Sc. in biochemistry from Brown University and a M.D. and Ph.D. in immunology from Stanford University.

We believe that Dr. Yao's medical background and experience in private equity investing, particularly with healthcare companies, qualify him to serve as a member of our board of directors.

Board composition and election of directors

The primary responsibility of our board of directors is to provide oversight, strategic guidance, counseling and direction to our management. Our board of directors meets on a regular basis and additionally as required. Our board of directors currently consists of four directors. The members of our board of directors were elected in compliance with the provisions of our amended and restated certificate of incorporation in effect at such time and an amended and restated voting agreement, which we refer to as our voting agreement, among us and certain of our stockholders. Our voting agreement will terminate upon the closing of this offering and none of our stockholders will have any special rights regarding the election or designation of members of our board of directors following the closing of this offering. See "Certain relationships and related party transactions—Voting agreement" for a discussion of our voting agreement.

Director independence

Our board of directors currently consists of four members. Our board of directors has determined that, of our four directors, and do not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director and that each of these directors is "independent" as that term is defined under the applicable listing rules of The Nasdaq Stock Market LLC, or the Nasdaq rules. There are no family relationships among any of our directors or executive officers.

Classified board of directors

In accordance with our amended and restated certificate of incorporation that will go into effect upon the closing of this offering, our board of directors will be divided into three classes with staggered, three-year terms. At each annual meeting of stockholders, the successors to directors whose terms then expire will be elected to serve from the time of election and qualification until the third annual meeting following election. Effective upon the closing of this offering, our directors will be divided among the three classes as follows:

- the Class I directors will be , and , and their terms will expire at our first annual meeting of stockholders following this offering;
- the Class II directors will be , and , and their terms will expire at our second annual meeting of stockholders following this offering; and
- the Class III directors will be , and , and their terms will expire at the third annual meeting of stockholders following this offering.

Our amended and restated certificate of incorporation and amended and restated bylaws that will go into effect upon the closing of this offering will provide that the authorized number of directors may be changed only by resolution of the board of directors. Any additional directorships resulting from an increase in the number of directors will be distributed among the three classes so that, as nearly as possible, each class will consist of one-third of the directors. The division of our board of directors into three classes with staggered three-year terms may delay or prevent a change of our management or a change in control of our company. Our directors may be removed only for cause by the affirmative vote of the holders of at least two-thirds of our outstanding voting stock entitled to vote in the election of directors.

Role of the board in risk oversight

One of the key functions of our board of directors is informed oversight of our risk management process. Our board of directors does not have a standing risk management committee, but rather administers this oversight function directly through our board of directors as a whole, as well as through various standing committees of our board of directors that address risks inherent in their respective areas of oversight. In particular, our board of directors is responsible for monitoring and assessing strategic risk exposure and our audit committee has the responsibility to consider and discuss our major financial risk exposures and the steps our management has taken to monitor and control these exposures, including guidelines and policies to govern the process by which risk assessment and management are undertaken. Our audit committee also monitors compliance with legal and regulatory requirements. Our nominating and corporate governance committee monitors the effectiveness of our corporate governance practices, including whether they are successful in preventing illegal or improper liability-creating conduct. Our compensation committee assesses and monitors whether any of our compensation policies and programs has the potential to encourage excessive risk-taking. While each committee is responsible for evaluating certain risks and overseeing the management of such risks, our entire board of directors is regularly informed through committee reports about such risks.

Board committees

Our board of directors has established three standing committees—audit, compensation, and nominating and corporate governance—each of which operates under a charter that has been approved by our board of directors. Upon our listing on The Nasdaq Global Market, each committee's charter will be available under the Corporate Governance section of our website at www.precisionbiosciences.com. The reference to our website address does not constitute incorporation by reference of the information contained at or available through our website, and you should not consider it to be a part of this prospectus.

Audit committee

Our audit committee's responsibilities include:

- appointing, approving the compensation of and assessing the independence of our registered public accounting firm;
- overseeing the work of our independent registered public accounting firm, including through the receipt and consideration of reports from such firm;
- reviewing and discussing with management and our independent registered public accounting firm our annual and quarterly financial statements and related disclosures;
- coordinating our board of directors' oversight of our internal control over financial reporting, disclosure controls and procedures and code of business conduct and ethics;
- establishing procedures for the receipt, retention and treatment of complaints we receive regarding financial controls, accounting or auditing matters and other matters;
- discussing our risk management policies;
- meeting independently with our internal auditing staff, if any, independent registered public accounting firm and management;
- reviewing on a periodic basis our investment policy;
- reviewing and approving or ratifying any related person transactions; and
- preparing the audit committee report required by SEC rules.

The members of our audit committee are , and . serves as the chairperson of the committee. All members of our audit committee meet the requirements for financial literacy under the Nasdaq rules. Our board of directors has determined that and meet the independence requirements of Rule 10A-3 under the Exchange Act and the applicable Nasdaq rules. Our board of directors has determined that is an "audit committee financial expert" as defined by applicable SEC rules and has the requisite financial sophistication as defined under the applicable Nasdaq rules.

Compensation committee

Our compensation committee's responsibilities include:

- reviewing and approving, or recommending for approval by the board of directors, the compensation of our CEO and our other executive officers;
- overseeing and administering our cash and equity incentive plans;
- reviewing and making recommendations to our board of directors with respect to director compensation;
- reviewing and discussing annually with management our "Compensation discussion and analysis," to the extent required; and
- preparing the annual compensation committee report required by SEC rules, to the extent required.

The members of our compensation committee are , and . serves as the chairperson of the committee. Our board of directors has determined that each of ,

and is independent under the applicable Nasdaq rules, including the Nasdaq rules specific to membership on our compensation committee, and is a “non-employee director” as defined in Rule 16b-3 promulgated under the Exchange Act.

Nominating and corporate governance committee

Our nominating and corporate governance committee’s responsibilities include:

- identifying individuals qualified to become board members;
- recommending to our board of directors the persons to be nominated for election as directors and to each board committee;
- developing and recommending to our board of directors corporate governance guidelines, and reviewing and recommending to our board of directors proposed changes to our corporate governance guidelines from time to time; and
- overseeing a periodic evaluation of our board of directors.

The members of our nominating and corporate governance committee are , and .. serves as the chairperson of the committee. Our board of directors has determined that , and are independent under the applicable Nasdaq rules.

Compensation committee interlocks and insider participation

No member of our compensation committee is or has been our current or former officer or employee. None of our executive officers served as a director or a member of a compensation committee (or other committee serving an equivalent function) of any other entity, one of whose executive officers served as a director or member of our compensation committee during the fiscal year ended December 31, 2017.

Code of ethics and code of conduct

We have adopted a written code of business conduct and ethics that applies to our directors, officers and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. Upon our listing on The Nasdaq Global Market, our code of business conduct and ethics will be available under the Corporate Governance section of our website at www.precisionbiosciences.com. In addition, we intend to post on our website all disclosures that are required by law or the Nasdaq rules concerning any amendments to, or waivers from, any provision of the code. The reference to our website address does not constitute incorporation by reference of the information contained at or available through our website, and you should not consider it to be a part of this prospectus.

Executive compensation

This section discusses the material components of our 2017 compensation program for our principal executive officer and next two most highly compensated executive officers who are named in the Summary compensation table below. These “named executive officers” and their positions are:

- Matthew Kane, President and Chief Executive Officer;
- Fayaz Khazi, Chief Executive Officer, Elo Life Systems; and
- David Thomson, Chief Development Officer.

This discussion may contain forward-looking statements that are based on our current plans, considerations, expectations and determinations regarding future compensation programs. Actual compensation programs that we adopt following the completion of this offering may differ materially from the currently planned programs summarized in this discussion.

Summary compensation table

The following table sets forth information concerning the compensation of our named executive officers for the year ended December 31, 2017:

Name and principal position	Year	Salary ($)	Bonus ($)(1)	Option awards ($)(2)	All other compensation($)	Total ($)
Matthew Kane President and Chief Executive Officer	2017	350,000	124,900	18,041	8,863(3)	501,804
Fayaz Khazi CEO, Elo Life Systems	2017	216,666(4)	184,500	126,288	114,784(5)	642,238
David Thomson Chief Development Officer	2017	176,346(6)	176,000	181,527	16,962(7)	550,835

(1) The amounts reported represent bonuses based upon our board’s assessment of the achievement of company and individual performance objectives for 2017, which were paid in January 2018, as well as other additional bonuses paid during 2017 that were generally payable to our other employees. With respect to Drs. Khazi and Thomson, the amounts reported also include one-time signing bonuses of $85,000 and $70,000, respectively.

(2) The amounts reported reflect the grant date fair value of stock options granted during 2017 computed in accordance with Accounting Standards Codification 718, Compensation—Stock Compensation, or ASC 718, rather than the amounts paid to or realized by the named individual. We provide information regarding the assumptions used to calculate the value of the option awards in Note 7 to our consolidated financial statements included in this prospectus.

(3) The amount reported includes 401(k) matching contributions by us of $8,848 and tax gross-ups of $15 in connection with nondiscriminatory wellness reimbursements.

(4) Dr. Khazi joined our company in May 2017. The amount reported represents the base salary that he earned for the portion of 2017 that he was employed. Dr. Khazi’s annual base salary for 2017 was $325,000.

(5) The amount reported represents relocation and housing expenses of $104,670 in connection with Dr. Khazi’s hiring and $9,723 of tax gross-ups in connection therewith and premiums of $392 we paid for supplemental disability insurance for Dr. Khazi.

(6) Dr. Thomson joined our company in June 2017. The amount reported represents the base salary that he earned for the portion of 2017 that he was employed. Dr. Thomson’s annual base salary for 2017 was $350,000.

(7) The amount reported represents relocation and housing expenses of $12,787 in connection with Dr. Thomson’s hiring and $2,904 of tax gross-ups in connection therewith and premiums of $1,271 we paid for supplemental disability insurance for Dr. Thomson.

2017 salaries

Our named executive officers receive a base salary to compensate them for services rendered to us. The base salary payable to each named executive officer is intended to provide a fixed component of compensation

reflecting the executive's skill set, experience, role and responsibilities. None of our named executive officers is currently party to an employment agreement or other agreement or arrangement that provides for automatic or scheduled increases in base salary. The following table shows the annual base salaries for 2017 and 2018 of our named executive officers:

Name and principal position	2017 Base salary ($)	2018 Base salary ($)
Matthew Kane President and Chief Executive Officer	350,000	350,000
Fayaz Khazi CEO, Elo Life Systems	325,000	335,000
David Thomson Chief Development Officer	350,000	355,000

2017 bonuses

In addition to base salaries, our named executive officers were eligible to receive a cash bonus based on company and individual performance for 2017. Pursuant to the employment agreements entered into with our named executive officers, Mr. Kane is eligible to receive an annual bonus of up to 30% of his base salary; Dr. Khazi is eligible to receive an annual bonus of up to 40% of his base salary (to a maximum of $130,000); and Dr. Thomson is eligible to receive an annual bonus of up to 35% of his base salary. In January 2018, we paid performance bonuses of $122,500 to Mr. Kane, $97,500 to Dr. Khazi and $105,000 to Dr. Thomson with respect to 2017. In addition, as described in the footnotes to the Summary compensation table, Drs. Khazi and Thomson received signing bonuses of $85,000 and $70,000, respectively, in connection with joining our company in 2017. Our executive officers also received certain additional bonuses during 2017 of less than $5,000 that were generally payable to our other employees.

Equity compensation

Our equity award program is the primary vehicle for offering long-term incentives to our executives. We believe that equity awards provide our executives with a strong link to our long-term performance, create an ownership culture and help to align the interests of our executives and our stockholders. To date, we have used stock option grants for this purpose because we believe they are an effective means by which to align the long-term interests of our executive officers with those of our stockholders. The use of options also can provide tax and other advantages to our executive officers relative to other forms of equity compensation. We believe that our equity awards are an important retention tool for our executive officers, as well as for our other employees.

We award stock options broadly to our employees, including to our non-executive employees. Grants to our executives and other employees are made at the discretion of our board of directors and are not made at any specific time period during a year. The grants of stock options to Drs. Khazi and Thomson in 2017 were made in connection with each executive's joining our company in 2017.

We granted the following stock options to our named executive officers during 2017 under our 2015 Plan, which is described below:

Named executive officers	2017 Stock options granted
Matthew Kane	50,000
Fayaz Khazi	350,000
David Thomson	500,000

In connection with this offering, we intend to adopt our 2019 Plan to facilitate the grant of cash and equity incentives to directors, employees (including our named executive officers) and consultants of our company and to enable our company to obtain and retain services of these individuals, which we believe are essential to our long-term success. Following the effective date of our 2019 Plan, we will not make any further grants under our 2015 Plan. However, our 2015 Plan will continue to govern the terms and conditions of the outstanding awards granted under it. For additional information about our 2019 Plan, see "—Incentive plans" below.

Retirement plans

We currently maintain the Precision BioSciences, Inc. 401(k) Plan, a defined contribution retirement savings plan, or the 401(k) Plan, for the benefit of our employees, including our named executive officers, who satisfy certain eligibility requirements. Our named executive officers are eligible to participate in the 401(k) Plan on the same terms as other full-time employees. The Code allows eligible employees to defer a portion of their compensation, within prescribed limits, on a pre-tax basis through contributions to the 401(k) Plan. We have historically matched participants' elective salary deferral contributions to the 401(k) Plan up to 50% of the first 6% of the employee's salary deferred. Matching contributions made by us vest 25% each year and are fully vested after four years. We believe that providing a vehicle for tax-deferred retirement savings though our 401(k) Plan, and making matching contributions, adds to the overall desirability of our executive compensation package and further incentivizes our employees, including our named executive officers, in accordance with our compensation policies.

Employee benefits and perquisites

Our named executive officers are eligible to participate in our employee benefit plans and programs, which include medical, dental and vision benefits, health and flexible spending accounts, life, short-term, long-term and supplemental individual disability, and supplemental insurance and wellness and tuition reimbursement to the same extent as our other full-time employees generally, subject to the terms and eligibility requirements of those plans. We also provide Mr. Kane and Drs. Khazi and Thomson, along with certain other executive officers and senior employees, with certain supplemental disability insurance benefits. We also provide relocation benefits to our named executive officers as determined in our board's discretion.

Outstanding equity awards at 2017 fiscal year-end

The following table summarizes the number of shares of common stock underlying outstanding equity incentive plan awards for each of our named executive officers as of December 31, 2017.

	Option awards			
Name	**Number of securities underlying unexercised options (#) exercisable**	**Number of securities underlying unexercised options (#) unexercisable**	**Option exercise price ($)**	**Option expiration date**
Matthew Kane	688,888	—	0.0145	5/17/2021
	—	50,000(1)	0.55	3/23/2027
Fayaz Khazi	—	350,000(1)	0.55	4/30/2027
David Thomson	—	500,000(1)	0.55	6/29/2027

(1) Award vests as to 25% of the underlying shares on March 24, 2018 with respect to Mr. Kane, March 24, 2018 with respect to Dr. Khazi and May 31, 2018 with respect to Dr. Thomson and in equal installments at the end of each three-month period over the following 36 months, subject to the named executive officer's continued employment with us.

Employment agreements

We have entered into employment agreements with each our named executive officers that set forth the terms and conditions of each executive's employment with us.

Each employment agreement establishes an annual base salary for each named executive officer, which is subject to our discretionary review and adjustment in accordance with our policies, procedures and practices as they may exist from time to time provided that no named executive officer's base salary may be decreased unless the decrease is an across-the-board decrease of all senior management employees of our company. See "Summary compensation table—2017 salaries" above for the base salaries in effect for 2017 and 2018. Each of our named executive officers is also eligible to receive an annual bonus. Mr. Kane is eligible to receive an annual bonus of up to 30% of his base salary, Dr. Khazi is eligible to receive an annual bonus of up to 40% of his base salary (to a maximum of $130,000), and Dr. Thomson is eligible to receive an annual bonus of up to 35% of his base salary. The named executive officers are eligible to participate in all medical, dental and disability insurance, the 401(k), personal leave and other employee benefit plans and programs for which the named executive officer is eligible, subject to the terms and conditions of such plans and programs. Each employment agreement further provides for the reimbursement of reasonable and necessary business expenses actually incurred by the named executive officer in performing services for us.

Each named executive officer's employment agreement and employment are terminable by either the named executive officer or us without cause on 30-days' notice. In the event that a named executive officer's employment is terminated by us without cause or for disability or by the executive for good reason, in each case as defined in the employment agreements, then in addition to any accrued amounts and subject to such named executive officer's timely delivering an effective release of claims in our favor, he will be entitled to receive (1) payment of an amount equal to six months of the named executive officer's base salary in the case of Mr. Kane or nine months in the case of Drs. Khazi and Thomson, except in the case of termination for disability, in which case the amount will be three months for either Dr. Khazi or Dr. Thomson, paid in substantially similar installments on same payroll applicable to him immediately prior to his separation from service, subject to certain exceptions, (2) payment of any bonus that has been earned but not yet paid as of the date of termination, and (3) reimbursement for additional costs the executive incurs for continued coverage under our group health insurance under the Consolidated Budget Reconciliation Act of 1985, or COBRA, for the applicable severance period or, if sooner, until comparable coverage is available in connection with subsequent employment. Upon termination of employment by us for cause or due to death or by the named executive officer other than for good reason, he will not be entitled to any additional compensation beyond any earned but unpaid salary.

Notwithstanding the foregoing, the employment agreements provide that, in the event a named executive officer's employment is terminated by us without cause or by the named executive officer for good reason within 12 months for Mr. Kane or six months for Drs. Khazi or Thomson after the occurrence of a change in control, as defined in the employment agreements, then, subject to his timely executing a release of claims, the period for which he is entitled to receive his monthly salary and reimbursement for continued group health insurance coverage under COBRA described above shall increase from six or nine months, as applicable, to 12 months.

Under the employment agreement with Mr. Kane and a separate proprietary information, inventions, non-competition and non-solicitation agreement with each of Drs. Khazi and Thomson, each named executive officer has agreed to refrain from competing with us or soliciting our employees, in each case, while employed and following the termination of his employment for any reason for a period of two years for Mr. Kane or 12 months for Drs. Khazi and Thomson, and has acknowledged our ownership rights in any intellectual property and assigned any such ownership rights to us.

In connection with this offering, we are evaluating entering into amended and restated employment agreements with our named executive officers.

Incentive plans

The following summarizes the material terms of the long-term incentive compensation plan in which our named executive officers will be eligible to participate following the consummation of this offering and our 2015 Plan and 2006 Plan under which we have previously made periodic grants of equity and equity-based awards to our named executive officers and other key employees.

2019 Incentive award plan

We intend to adopt and ask our stockholders to approve our 2019 Plan to be effective upon the effectiveness of the registration statement of which this prospectus forms a part, under which we may grant cash and equity-based incentive awards to eligible service providers in order to attract, retain and motivate the persons who make important contributions to our company. The material terms of our 2019 Plan are summarized below.

Eligibility and administration

Our employees, consultants and directors, and employees and consultants of our subsidiaries, will be eligible to receive awards under our 2019 Plan. Our 2019 Plan will be administered by our board of directors, which may delegate its duties and responsibilities to one or more committees of our directors and/or officers (referred to collectively as the plan administrator below), subject to the limitations imposed under our 2019 Plan, Section 16 of the Exchange Act, stock exchange rules and other applicable laws. The plan administrator will have the authority to take all actions and make all determinations under our 2019 Plan, to interpret our 2019 Plan and award agreements and to adopt, amend and repeal rules for the administration of our 2019 Plan as it deems advisable. The plan administrator will also have the authority to determine which eligible service providers receive awards, grant awards and set the terms and conditions of all awards under our 2019 Plan, including any vesting and vesting acceleration provisions, subject to the conditions and limitations in our 2019 Plan.

Shares available for awards

An aggregate of shares of our common stock will initially be available for issuance under our 2019 Plan. The number of shares initially available for issuance will be increased by an annual increase on January 1 of each calendar year beginning in and ending in and including , equal to the least of (1) , (2) % of the shares of common stock outstanding on the final day of the immediately preceding calendar year and (3) a smaller number of shares determined by our board of directors. No more than shares of common stock may be issued under our 2019 Plan upon the exercise of incentive stock options, or ISOs. Shares issued under our 2019 Plan may be authorized but unissued shares, shares purchased on the open market or treasury shares.

If an award under our 2019 Plan, our 2015 Plan or our 2006 Plan expires, lapses or is terminated, exchanged for cash, surrendered, repurchased, canceled without having been fully exercised or forfeited, any unused shares subject to the award will, as applicable, become or again be available for new grants under our 2019 Plan. Awards granted under our 2019 Plan in substitution for any options or other stock or stock-based awards granted by an entity before the entity's merger or consolidation with us or our acquisition of the entity's property or stock will not reduce the shares available for grant under our 2019 Plan, but will count against the maximum number of shares that may be issued upon the exercise of ISOs, as applicable.

In addition, the maximum aggregate grant date fair value as determined in accordance with ASC 718 (or any successor thereto), of awards granted to any non-employee director for services as a director pursuant to our 2019 Plan during any fiscal year may not exceed $ (or, in the fiscal year of any director's initial service, $). The plan administrator may, however, make exceptions to such limit on director compensation in extraordinary circumstances, subject to the limitations in our 2019 Plan.

Awards

Our 2019 Plan provides for the grant of stock options, including ISOs, and nonqualified stock options, or NSOs, stock appreciation rights, or SARs, restricted stock, dividend equivalents, restricted stock units, or RSUs, and other stock or cash based awards. Certain awards under our 2019 Plan may constitute or provide for payment of "nonqualified deferred compensation" under Section 409A of the Code. All awards under our 2019 Plan will be set forth in award agreements, which will detail the terms and conditions of awards, including any applicable vesting and payment terms and post-termination exercise limitations. A brief description of each award type follows.

- Stock Options and SARs. Stock options provide for the purchase of shares of our common stock in the future at an exercise price set on the grant date. ISOs, by contrast to NSOs, may provide tax deferral beyond exercise and favorable capital gains tax treatment to their holders if certain holding periods and other requirements of the Code are satisfied. SARs entitle their holder, upon exercise, to receive from us an amount equal to the appreciation of the shares subject to the award between the grant date and the exercise date. The plan administrator will determine the number of shares covered by each option and SAR, the exercise price of each option and SAR and the conditions and limitations applicable to the exercise of each option and SAR. The exercise price of a stock option or SAR will not be less than 100% of the fair market value of the underlying share on the grant date (or 110% in the case of ISOs granted to certain significant stockholders), except with respect to certain substitute awards granted in connection with a corporate transaction. The term of a stock option or SAR may not be longer than ten years (or five years in the case of ISOs granted to certain significant stockholders).
- Restricted Stock and RSUs. Restricted stock is an award of nontransferable shares of our common stock that remain forfeitable unless and until specified conditions are met and which may be subject to a purchase price. RSUs are contractual promises to deliver shares of our common stock in the future, which may also remain forfeitable unless and until specified conditions are met and may be accompanied by the right to receive the equivalent value of dividends paid on shares of our common stock prior to the delivery of the underlying shares. The plan administrator may provide that the delivery of the shares underlying RSUs will be deferred on a mandatory basis or at the election of the participant. The terms and conditions applicable to restricted stock and RSUs will be determined by the plan administrator, subject to the conditions and limitations contained in our 2019 Plan.
- Other Stock or Cash Based Awards. Other stock or cash based awards are awards of cash, fully vested shares of our common stock and other awards valued wholly or partially by referring to, or otherwise based on, shares of our common stock or other property. Other stock or cash based awards may be granted to participants and may also be available as a payment form in the settlement of other awards, as standalone payments and as payment in lieu of compensation to which a participant is otherwise entitled. The plan administrator will determine the terms and conditions of other stock or cash based awards, which may include any purchase price, performance goal, transfer restrictions and vesting conditions.

Performance criteria

The plan administrator may select performance criteria for an award to establish performance goals for a performance period. Performance criteria under our 2019 Plan may include, but are not limited to, the following: net earnings or losses (either before or after one or more of interest, taxes, depreciation, amortization, and non-cash equity-based compensation expense); gross or net sales or revenue or sales or revenue growth; net income (either before or after taxes) or adjusted net income; profits (including but not limited to gross profits, net profits, profit growth, net operation profit or economic profit), profit return ratios or operating margin; budget or operating earnings (either before or after taxes or before or after allocation of corporate overhead and bonus); cash flow (including operating cash flow and free cash flow or cash flow return on capital); return on assets; return on capital or invested capital; cost of capital; return on stockholders' equity; total stockholder return; return on sales; costs, reductions in costs and cost control measures; expenses; working capital; earnings or loss per share; adjusted earnings or loss per share; price per share or dividends per share (or appreciation in or maintenance of such price or dividends); regulatory achievements or compliance; implementation, completion or attainment of objectives relating to research, development, regulatory, commercial, or strategic milestones or developments; market share; economic value or economic value added models; division, group or corporate financial goals; customer satisfaction/growth; customer service; employee satisfaction; recruitment and maintenance of personnel; human resources management; supervision of litigation and other legal matters; strategic partnerships and transactions; financial ratios (including those measuring liquidity, activity, profitability or leverage); debt levels or reductions; sales-related goals; financing and other capital raising transactions; cash on hand; acquisition activity; investment sourcing activity; and marketing initiatives, any of which may be measured in absolute terms or as compared to any incremental increase or decrease. Such performance goals also may be based solely by reference to the company's performance or the performance of a subsidiary, division, business segment or business unit of the company or a subsidiary, or based upon performance relative to performance of other companies or upon comparisons of any of the indicators of performance relative to performance of other companies. When determining performance goals, the plan administrator may provide for exclusion of the impact of an event or occurrence which the plan administrator determines should appropriately be excluded, including, without limitation, non-recurring charges or events, acquisitions or divestitures, changes in the corporate or capital structure, events unrelated to the business or outside of the control of management, foreign exchange considerations, and legal, regulatory, tax or accounting changes.

Certain transactions

In connection with certain corporate transactions and events affecting our common stock, including a change in control, or change in any applicable laws or accounting principles, the plan administrator has broad discretion to take action under our 2019 Plan to prevent the dilution or enlargement of intended benefits, facilitate the transaction or event or give effect to the change in applicable laws or accounting principles. This includes canceling awards for cash or property, accelerating the vesting of awards, providing for the assumption or substitution of awards by a successor entity, adjusting the number and type of shares subject to outstanding awards and/or with respect to which awards may be granted under our 2019 Plan and replacing or terminating awards under our 2019 Plan. In addition, in the event of certain non-reciprocal transactions with our stockholders, the plan administrator will make equitable adjustments to our 2019 Plan and outstanding awards as it deems appropriate to reflect the transaction.

Plan amendment and termination

Our board of directors may amend or terminate our 2019 Plan at any time; however, no amendment, other than an amendment that increases the number of shares available under our 2019 Plan, may materially and

adversely affect an award outstanding under our 2019 Plan without the consent of the affected participant, and stockholder approval will be obtained for any amendment to the extent necessary to comply with applicable laws. Further, the plan administrator cannot, without the approval of our stockholders, amend any outstanding stock option or SAR to reduce its price per share. Our 2019 Plan will remain in effect until the tenth anniversary of its effective date, unless earlier terminated by our board of directors. No awards may be granted under our 2019 Plan after its termination.

Foreign participants, claw-back provisions, transferability and participant payments

The plan administrator may modify awards granted to participants who are foreign nationals or employed outside the United States or establish subplans or procedures to address differences in laws, rules, regulations or customs of such foreign jurisdictions. All awards will be subject to any company claw-back policy as set forth in such claw-back policy or the applicable award agreement. Except as the plan administrator may determine or provide in an award agreement, awards under our 2019 Plan are generally non-transferrable, except by will or the laws of descent and distribution, or, subject to the plan administrator's consent, pursuant to a domestic relations order, and are generally exercisable only by the participant. With regard to tax withholding obligations arising in connection with awards under our 2019 Plan, and exercise price obligations arising in connection with the exercise of stock options under our 2019 Plan, the plan administrator may, in its discretion, accept cash, wire transfer or check, shares of our common stock that meet specified conditions, a promissory note, a "market sell order," such other consideration as the plan administrator deems suitable or any combination of the foregoing.

2015 Stock incentive plan

Our board of directors and stockholders have approved our 2015 Plan, under which we may grant stock options, restricted stock, RSUs and other stock-based awards to employees, officers, directors, consultants, advisors, advisory board members and other service providers. A total of 11,250,000 shares of our common stock have been authorized for issuance under our 2015 Plan. As of the date of this prospectus, awards of stock options are outstanding under our 2015 Plan.

Following the effectiveness of our 2019 Plan, we will not make any further grants under our 2015 Plan. However, our 2015 Plan will continue to govern the terms and conditions of the outstanding awards granted under it. Shares of our common stock subject to awards granted under our 2015 Plan that are forfeited, lapse unexercised or are settled in cash and which following the effective date of our 2019 Plan are not issued under our 2015 Plan will be available for issuance under our 2019 Plan.

Administration

Our 2015 Plan is administered by our board of directors, which may delegate its duties and responsibilities to one or more committees of our directors (referred to collectively as our board of directors below) to the extent permitted by applicable law. Our board of directors has the authority to grant awards under our 2015 Plan and to adopt, amend, and repeal such administrative rules, guidelines, and practices relating to our 2015 Plan as it shall deem advisable. Our board of directors may correct any defect, supply any omission, or reconcile any inconsistency in our 2015 Plan or any award thereunder in the manner and to the extent it deems expedient to carry our 2015 Plan into effect.

Types of awards

Our 2015 Plan provides for the grant of stock options, including NSOs and ISOs, restricted stock, RSUs and other stock-based awards to employees, officers, directors, consultants, advisors, advisory board members or other

service providers, except that stock options intended to qualify as ISOs under the Code may only be granted to employees.

Certain adjustments

In the event of certain changes in capitalization, or any dividend or distribution to holders of our common stock other than an ordinary cash dividend, the number and class of securities available under our 2015 Plan and the number and class of securities and exercise price per share of each outstanding option will be equitably adjusted by us (or substituted awards may be made, if applicable) in the manner determined by our board of directors.

Change in control

Unless otherwise specifically provided in an award agreement, our board of directors may take any one or more of the following actions as to all (or any portion of) outstanding options on such terms as our board of directors determines in connection with a change in control, as defined in our 2015 Plan: (1) provide for the assumption or substitution of the award; (2) upon written notice to a participant, provide for the termination of all unexercised options unless exercised within a specific period; (3) provide that outstanding options will become exercisable prior to or upon such change in control; (4) in the event of a change in control in which holders of our common stock will receive cash payment for shares surrendered, make or provide for a cash payment to participants based on the excess, if any of (a) the change in control consideration times the number of shares subject to outstanding options less (b) the aggregate exercise price of the outstanding options, in exchange for termination of such options; (5) provide that, in connection with our liquidation or dissolution, awards shall convert into the right to receive liquidation proceeds (if applicable, net of the exercise price thereof); or (c) any combination of the foregoing.

Plan amendment and termination

Our board of directors may amend, suspend or terminate our 2015 Plan at any time; provided, however, that if at any time the approval of our stockholders is required as to any modification or amendment under Section 422 of the Code or any successor provision with respect to ISOs, our board may not effect such modification or amendment without such approval. Unless otherwise specified in the amendment, any amendment to our 2015 Plan will apply to, and be binding on the holders of, all awards outstanding under our 2015 Plan at the time the amendment is adopted, provided our board determines that such amendment does not materially and adversely affect the rights of participants under our 2015 Plan. Our 2015 Plan will remain in effect until the tenth anniversary of its effective date, unless earlier terminated by our board of directors. No awards may be granted under our 2015 Plan after its termination.

Transferability of awards

Except as our board may otherwise expressly determine or provide in an award, awards under our 2015 Plan may not be sold, assigned, transferred, pledged or otherwise encumbered by the person to whom they are granted, either voluntarily or by operation of law, except by will or the laws of descent and distribution or, other than in the case of an ISO, pursuant to a qualified domestic relations order, and, during the life of the participant, shall be exercisable only by the participant.

2006 Stock incentive plan

Our board of directors previously adopted and our stockholders approved our 2006 Plan in May 2006. Our 2006 Plan expired in accordance with its terms in May 2016 and no further stock awards may be granted under

our 2006 Plan. Any awards granted under our 2006 Plan remain subject to the terms of our 2006 Plan and applicable award agreements, until such outstanding awards that are stock options are exercised, or until they terminate or expire by their terms.

Administration

Our 2006 Plan is administered by our board of directors, which may delegate its duties and responsibilities to one or more committees of our directors (referred to collectively as our board of directors below) to the extent permitted by applicable law. Prior to the expiration of our 2006 plan, our board of directors had the authority to grant awards under our 2006 Plan, and our board of directors has the authority to adopt, amend, and repeal such administrative rules, guidelines, and practices relating to our 2006 Plan as it shall deem advisable. Our board of directors may correct any defect, supply any omission, or reconcile any inconsistency in our 2006 Plan or any award thereunder in the manner and to the extent it deems expedient to carry our 2006 Plan into effect.

Types of awards

Our 2006 Plan provided for the grant of stock options, including NSOs and ISOs, restricted stock, RSUs and other stock-based awards to employees, officers, directors, consultants and advisors, except that stock options intended to qualify as ISOs under the Code were only permitted to be granted to employees. As of the date of this prospectus, awards of stock options are outstanding under our 2006 Plan.

Certain adjustments

In the event of certain changes in capitalization, or any dividend or distribution to holders of our common stock other than an ordinary cash dividend, the number and class of securities available under our 2006 Plan and the number and class of securities and exercise price per share of each outstanding option will be equitably adjusted by us (or substituted awards may be made, if applicable) in the manner determined by our board of directors.

Reorganization

Our board of directors may take any one or more of the following actions as to all (or any portion of) outstanding awards on such terms as our board of directors determines in connection with a reorganization, as defined in our 2006 Plan: (1) provide for the assumption or substitution of the award, (2) upon written notice to a participant, provide for the termination of all unexercised options unless exercised within a specific period, (3) provide that outstanding options will become exercisable prior to or upon such reorganization, (4) in the event of a reorganization in which holders of our common stock will receive cash payment for shares surrendered, make or provide for a cash payment to participants equal to (a) the reorganization consideration times the number of shares subject to outstanding options minus (b) the aggregate exercise price of the outstanding options, in exchange for termination of such options, (5) provide that, in connection with our liquidation or dissolution, awards shall convert into the right to receive liquidation proceeds (if applicable, net of the exercise price thereof) and (6) any combination of the foregoing.

Transferability of awards

Except as our board may otherwise have expressly determined or provided in an award, awards under our 2006 Plan may not be sold, assigned, transferred, pledged or otherwise encumbered by the person to whom they are granted, either voluntarily or by operation of law, except by will or the laws of descent and distribution or, other than in the case of an ISO, pursuant to a qualified domestic relations order, and, during the life of the participant, shall be exercisable only by the participant.

2019 Employee stock purchase plan

We intend to adopt and ask our stockholders to approve our 2019 ESPP to be effective upon the effectiveness of the registration statement of which this prospectus forms a part. The material terms of our 2019 ESPP are summarized below.

Shares available for awards; administration

A total of shares of our common stock will initially be reserved for issuance under our 2019 ESPP. In addition, the number of shares available for issuance under our 2019 ESPP will be annually increased on January 1 of each calendar year beginning in and ending in and including , by an amount equal to the least of (1) % of the shares outstanding on the final day of the immediately preceding calendar year and (2) such smaller number of shares as is determined by our board of directors, provided that no more than shares of our common stock may be issued under our 2019 ESPP. The foregoing numbers are subject to adjustment in certain events, as described below. Our board of directors or a committee of our board of directors will have authority to interpret the terms of our 2019 ESPP and determine eligibility of participants. We expect that the compensation committee will be the initial administrator of our 2019 ESPP.

Eligibility

Our employees are eligible to participate in our 2019 ESPP if they are customarily employed by us or a participating subsidiary for more than twenty hours per week and more than five months in any calendar year. However, an employee may not be granted rights to purchase stock under our 2019 ESPP if the employee, immediately after the grant, would own (directly or through attribution) stock possessing 5% or more of the total combined voting power or value of all classes of our stock.

Grant of rights

Our 2019 ESPP is intended to qualify under Section 423 of the Code and stock will be offered under our 2019 ESPP during offering periods. The length of the offering periods under our 2019 ESPP will be determined by the plan administrator and may be up to twenty-seven months long. Employee payroll deductions will be used to purchase shares on each purchase date during an offering period. The purchase dates for each offering period will be the final trading day in the offering period. Offering periods under our 2019 ESPP will commence when determined by the plan administrator. The plan administrator may, in its discretion, modify the terms of future offering periods.

Our 2019 ESPP permits participants to purchase common stock through payroll deductions of up to % of their eligible compensation, which includes a participant's gross base compensation for services to us, including overtime payments and excluding sales commissions, incentive compensation, bonuses, expense reimbursements, fringe benefits and other special payments. The plan administrator will establish a maximum number of shares that may be purchased by a participant during any offering period, which, in the absence of a contrary designation, will be shares. In addition, no employee will be permitted to accrue the right to purchase stock under our 2019 ESPP at a rate in excess of $25,000 worth of shares during any calendar year during which such a purchase right is outstanding (based on the fair market value per share of our common stock as of the first day of the offering period).

On the first trading day of each offering period, each participant will automatically be granted an option to purchase shares of our common stock. The option will expire at the end of the applicable offering period, and will be exercised at that time to the extent of the payroll deductions accumulated during the offering period. The purchase price of the shares, in the absence of a contrary designation, will be 85% of the lower of the fair

market value of our common stock on the first trading day of the offering period or on the purchase date. Participants may voluntarily end their participation in our 2019 ESPP at any time at least one week prior to the end of the applicable offering period, and will be paid their accrued payroll deductions that have not yet been used to purchase shares of common stock. Participation ends automatically upon a participant's termination of employment.

A participant may not transfer rights granted under our 2019 ESPP other than by will or the laws of descent and distribution.

Certain transactions

In the event of certain non-reciprocal transactions or events affecting our common stock known as "equity restructurings," the plan administrator will make equitable adjustments to our 2019 ESPP and outstanding rights. In the event of certain unusual or non-recurring events or transactions, including a change in control, the plan administrator may provide for (1) either the replacement of outstanding rights with other rights or property or termination of outstanding rights in exchange for cash, (2) the assumption or substitution of outstanding rights by the successor or survivor corporation or parent or subsidiary thereof, if any, (3) the adjustment in the number and type of shares of stock subject to outstanding rights, (4) the use of participants' accumulated payroll deductions to purchase stock on a new purchase date prior to the next scheduled purchase date and termination of any rights under ongoing offering periods or (5) the termination of all outstanding rights.

Plan amendment

The plan administrator may amend, suspend or terminate our 2019 ESPP at any time. However, stockholder approval will be obtained for any amendment that increases the aggregate number or changes the type of shares that may be sold pursuant to rights under our 2019 ESPP, changes the corporations or classes of corporations whose employees are eligible to participate in our 2019 ESPP or changes our 2019 ESPP in any manner that would cause our 2019 ESPP to no longer be an employee stock purchase plan within the meaning of Section 423(b) of the Code.

Non-employee director compensation policy

Historically, our directors have not received compensation for their service on our board of directors. We intend to approve and implement a compensation program for our non-employee directors that will become effective upon the effectiveness of the registration statement of which this prospectus is a part. The terms of our non-employee director program are not yet known and will be described in this prospectus once they are determined.

Certain relationships and related party transactions

The following includes a summary of transactions since January 1, 2015, to which we have been a party in which the amount involved exceeded or will exceed $120,000, and in which any of our directors or executive officers or, to our knowledge, beneficial owners of more than 5% of our capital stock or any member of the immediate family of any of the foregoing persons had or will have a direct or indirect material interest, other than equity and other compensation, termination, change in control and other arrangements, which are described under “Executive compensation.” We also describe below certain other transactions with our directors, executive officers and stockholders.

Preferred stock financings

Series A preferred stock financing

In April 2015 and May 2015, we issued and sold to investors in a private placement 25,650,000 shares of our Series A preferred stock at a price per share of $1.00, for aggregate consideration of $25.65 million.

The following table summarizes the Series A preferred stock purchased by directors, executive officers, beneficial owners of more than 5% of our capital stock or any member of the immediate family of any of the foregoing persons.

Participants	Series A preferred stock	Total purchase price
5% or greater stockholders and directors(1)		
Amgen Investments Ltd.	3,000,000	$ 3,000,000
F-Prime Capital Partners Healthcare Fund IV LP(2)	7,000,000	$ 7,000,000
RA Capital Healthcare Fund, L.P.	3,000,000	$ 3,000,000
venBio Global Strategic Fund L.P.(3)	8,000,000	$ 8,000,000

(1) Additional details regarding these stockholders and their equity holdings are provided in this prospectus under the caption “Principal stockholders.”

(2) Ben Auspitz, a former member of our board of directors, is a partner at F-Prime Capital Partners. Mr. Auspitz does not hold voting or dispositive power over the shares held by F-Prime Capital Partners Healthcare Fund IV LP. See “Principal stockholders” below for more information.

(3) Robert Adelman, M.D., a member of our board of directors, is a partner at venBio Global Strategic Fund L.P. See “Principal stockholders” below for more information.

Series B preferred stock financing

From May 2018 to July 2018, we issued and sold to investors in a private placement 21,956,095 shares of our Series B preferred stock at a price per share of $5.01, for aggregate gross proceeds of approximately $110.0 million.

The following table summarizes the Series B preferred stock purchased by directors, executive officers, beneficial owners of more than 5% of our capital stock or any member of the immediate family of any of the foregoing persons.

Participants	Series B preferred stock	Total purchase price
5% or greater stockholders and directors(1)		
Amgen Investments Ltd.(2)	499,002	$ 2,500,000
F-Prime Capital Partners Healthcare Fund IV LP(3)	873,253	$ 4,374,997
RA Capital Healthcare Fund, L.P.	399,202	$ 2,000,002
venBio Global Strategic Fund, L.P.(4)	998,004	$ 5,500,000
Tony Yao(5)	9,500	$ 47,595

(1) Additional details regarding these stockholders and their equity holdings are provided in this prospectus under the caption “Principal stockholders.”

(2) Series B preferred stock was purchased by Amgen Ventures LLC, an affiliate of Amgen Investment Ltd.

(3) Ben Auspitz, a former member of our board of directors, is a partner at F-Prime Capital Partners. Mr. Auspitz does not hold voting or dispositive power over the shares held by F-Prime Capital Partners Healthcare Fund IV LP. See “Principal stockholders” below for more information.

(4) Robert Adelman, M.D., a member of our board of directors, is a partner at venBio Global Strategic Fund, L.P. See “Principal stockholders” below for more information.

(5) Tony Yao, M.D., Ph.D. is a current member of our board of directors. Dr. Yao is associated with the ArrowMark Funds (as defined below). See “Principal stockholders” below for more information.

Investors’ rights agreement

We are party to an amended and restated investors’ rights agreement, which we refer to as our investors’ rights agreement, with each holder of our convertible preferred stock and certain holders of our common stock (Derek Jantz, Matthew Kane and Jeff Smith), which includes each holder of more than 5% of our capital stock and each of our directors (or, in some cases, entities affiliated therewith). Our investors’ rights agreement imposes certain affirmative obligations on us and also grants certain rights to the holders, including certain registration rights with respect to the registrable securities held by them that will survive this offering. See “Description of capital stock—Registration rights” for additional information. This right of first offer does not apply to this offering and will terminate by its terms in connection with the closing of this offering.

Voting agreement

We are a party to an amended and restated voting agreement with certain of our stockholders, pursuant to which the following directors were elected to serve as members on our board of directors and, as of the date of this prospectus, continue to so serve: Matthew Kane, Derek Jantz, Robert Adelman and Tony Yao. Our voting agreement will terminate by its terms in connection with the closing of this offering, and members previously elected to our board of directors pursuant to this voting agreement will continue to serve as directors until they resign, are removed or their successors are duly elected by the holders of our common stock. The composition of our board of directors after this offering is described in more detail under “Management—Board composition and election of directors.”

Right of first refusal and co-sale agreement

We are party to an amended and restated right of first refusal and co-sale agreement with each holder of our convertible preferred stock and certain holders of our common stock (Derek Jantz, Matthew Kane and Jeff Smith), which includes each holder of more than 5% of our capital stock and certain of our directors (or, in some cases, entities affiliated therewith), pursuant to which we have a right of first refusal in respect of certain

sales of securities by Drs. Jantz and Smith and Mr. Kane. To the extent we do not exercise such right in full, the holders of our convertible preferred stock are granted certain rights of first refusal and co-sale in respect of such sale. The right of first refusal and co-sale agreement will terminate by its terms in connection with the closing of this offering.

Director and officer indemnification and insurance

We have agreed to indemnify each of our directors and executive officers against certain liabilities, costs and expenses and have purchased directors' and officers' liability insurance. See "Description of capital stock—Limitations on liability and indemnification matters."

Employment agreements

We have entered into employment agreements with our certain of our executive officers, including our named executive officers. For more information regarding the agreements with our named executive officers, see "Executive compensation—Employment agreements."

Stock option grants to executive officers and directors

We have granted stock options to our executive officers as more fully described in "Executive compensation."

Other transactions

In April 2017, in connection with a repurchase program approved by our board of directors, we repurchased 1,282,226 shares of common stock from J. Christopher Rhodes, a beneficial owner of more than 5% of our common stock, for aggregate proceeds of approximately $0.7 million.

Chelsea Lynam, Mr. Kane's wife, serves as our Manager, Facilities Planning & Design. Ms. Lynam received total compensation of $186,545 from the beginning of 2018 through September 30, 2018 in respect of base salary, bonus and the grant date fair value of options to purchase 45,000 shares of our common stock that were granted in April 2018. Ms. Lynam also participates in other employee benefit plans and arrangements that are made generally available to other employees.

Policies and procedures for related person transactions

Our board of directors has adopted a written related person transaction policy, to be effective upon the closing of this offering, setting forth the policies and procedures for the review and approval or ratification of related person transactions. This policy will cover, with certain exceptions set forth in Item 404 of Regulation S-K under the Securities Act, any transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships, in which we were or are to be a participant, where the amount involved exceeds $120,000 in any fiscal year and a related person had, has or will have a direct or indirect material interest, including, without limitation, purchases of goods or services by or from the related person or entities in which the related person has a material interest as well as indebtedness, guarantees of indebtedness and our employment of a related person. In reviewing and approving any such transactions, our audit committee is tasked to consider all relevant facts and circumstances, including, but not limited to, whether the transaction is on terms comparable to those that could be obtained in an arm's length transaction and the extent of the related person's interest in the transaction. All of the transactions described in this section occurred prior to the effectiveness of this policy.

Principal stockholders

The following table sets forth information with respect to the beneficial ownership of our common stock as of September 30, 2018 by:

- each person or group of affiliated persons known by us to beneficially own more than 5% of our common stock;
- each of our named executive officers;
- each of our directors; and
- all of our executive officers and directors as a group.

The number of shares beneficially owned by each stockholder is determined under rules promulgated by the SEC. Under these rules, beneficial ownership includes any shares as to which the individual or entity has sole or shared voting power or investment power. Each stockholder's percentage ownership is based on 81,390,126 shares of common stock outstanding as of September 30, 2018, assuming the conversion of all outstanding shares of preferred stock into 47,606,095 shares of our common stock upon the closing of this offering. In computing the number of shares beneficially owned by an individual or entity and the percentage ownership of that person, shares of common stock subject to options or other rights held by such person that are currently exercisable or will become exercisable within 60 days of September 30, 2018 are considered outstanding, although these shares are not considered outstanding for purposes of computing the percentage ownership of any other person. Unless otherwise noted, the address of all listed stockholders is c/o Precision BioSciences, 302 East Pettigrew St., Suite A-100, Durham, North Carolina 27701. Each of the stockholders listed has sole voting and investment power with respect to the shares beneficially owned by the stockholder unless otherwise noted, subject to community property laws where applicable.

		Percentage of shares beneficially owned	
Name of beneficial owner	**Number of shares beneficially owned**	**Before offering**	**After offering**
5% or Greater Stockholders			
venBio Global Strategic Fund, L.P.(1)	8,998,004	11.1%	
Jeff Smith, Ph.D.(2)	8,915,869	10.9%	
F-Prime Capital Partners Healthcare Fund IV LP(3)	7,873,253	9.7%	
Named Executive Officers and Directors			
Matthew Kane(4)	4,585,601	5.6%	
Fayaz Khazi, Ph.D.(5)	131,250	*	
David Thomson, Ph.D.(6)	156,250	*	
Robert Adelman, M.D.(1)	8,998,004	11.1%	
Derek Jantz, Ph.D.(7)	8,915,869	10.9%	
Tony Yao, M.D., Ph.D.(8)	1,996,008	2.5%	
All executive officers and directors as a group (10 persons)(9)	36,589,149	42.9%	

* Less than 1%.

(1) Consists of 8,000,000 shares of Series A preferred stock and 998,004 shares of Series B preferred stock. VenBio Global Strategic GP, L.P., or venBio GP, is the sole general partner of venBio Global Strategic Fund, L.P., or venBio, and venBio Global Strategic GP, Ltd., or venBio GP Ltd., is the sole general partner of venBio GP. Robert Adelman, one of our directors, and Corey Goodman are directors of venBio GP Ltd. and share voting and dispositive control over the shares held by venBio. The mailing address of venBio Global Strategic Fund, L.P. is c/o venBio Partners, LLC, 1700 Owens Street, Suite 595, San Francisco, CA 94158.

(2) Consists of (a) 8,208,231 shares of common stock and (b) 707,638 shares of common stock underlying options exercisable within 60 days of September 30, 2018.

(3) Consists of 7,000,000 shares of Series A preferred stock and 873,253 shares of Series B preferred stock. The general partner of F-Prime Capital Partners Healthcare Fund IV LP is F-Prime Capital Partners Healthcare Advisors Fund IV LP. F-Prime Capital Partners Healthcare Advisors Fund IV LP is solely managed by Impresa Management LLC, the managing member of its general partner and investment manager. Impresa Management LLC is owned, directly or indirectly, by various shareholders and employees of FMR LLC. Each of the entities listed above expressly disclaims beneficial ownership of the securities listed above except to the extent of any pecuniary interest therein. The mailing address of F-Prime Capital Partners Healthcare Fund IV LP is 245 Summer Street, Boston, MA 02210.

(4) Consists of (a) 3,847,616 shares of common stock held directly by Mr. Kane, (b) 17,222 shares of common stock held by Chelsea Lynam, Mr. Kane's wife, (c) 707,638 shares of common stock underlying options held by Mr. Kane exercisable within 60 days of September 30, 2018 and (d) 13,125 shares of common stock underlying options held by Ms. Lynam exercisable within 60 days of September 30, 2018.

(5) Consists of 131,250 shares of common stock underlying options exercisable within 60 days of September 30, 2018.

(6) Consists of 156,250 shares of common stock underlying options exercisable within 60 days of September 30, 2018.

(7) Consists of (a) 8,208,231 shares of common stock and (b) 707,638 shares of common stock underlying options exercisable within 60 days of September 30, 2018.

(8) Consists of 9,500 of Series B preferred stock held directly by Dr. Yao and 200,000 shares of Series B preferred stock held by ArrowMark Fundamental Opportunity Fund, L.P., 244,572 shares of Series B preferred stock held by ArrowMark Life Science Fund, 10,000 of Series B preferred stock held by CF Ascent LLC, 149,451 of Series B preferred stock held by Iron Horse Investments, LLC, or Iron Horse, 39,920 of Series B preferred stock held by Lookfar Investments, LLC, 624,759 of Series B preferred stock held by Meridian Growth Fund, or Meridian Growth, 558,855 of Series B preferred stock held by Meridian Small Cap Growth Fund, or Meridian Small Cap, 149,451 of Series B preferred stock held by THB Iron Rose, LLC, or THB Iron Rose, 9,500 of Series B preferred stock held by THB Iron Rose, LLC Life Science Portfolio, or THB Iron Rose Life Science, which are referred to collectively as the ArrowMark Funds. ArrowMark Colorado Holdings LLC, or ArrowMark Colorado, is investment advisor to ArrowMark Funds. Dr. Yao, one of our directors, is employed as a portfolio manager for ArrowMark Colorado and has direct voting and dispositive control over the shares held by ArrowMark Life Science Fund and THB Iron Rose Life Science. Mr. Yao may be considered the beneficial owner of the shares held by ArrowMark Life Science Fund and THB Iron Rose Life Science and disclaims beneficial ownership of such shares, except to the extent of any pecuniary interest therein. The principal business address of the ArrowMark Funds is 100 Fillmore Street, Suite 325, Denver, Colorado 80206.

(9) Consists of (a) 21,725,382 shares of common stock, (b) 3,869,755 shares of common stock underlying options exercisable within 60 days of September 30, 2018, (c) 8,000,000 shares of Series A preferred stock and (d) 2,994,012 of Series B preferred stock.

Description of capital stock

Capital structure

The following description of our capital stock and certain provisions of our amended and restated certificate of incorporation and amended and restated bylaws are summaries and are qualified by reference to the amended and restated certificate of incorporation and the amended and restated bylaws that will go into effect upon the closing of this offering. Copies of these documents will be filed with the SEC as exhibits to our registration statement, of which this prospectus forms a part. The descriptions of our common stock and preferred stock reflect changes to our capital structure that will occur upon the closing of this offering.

General

Upon the completion of this offering, our authorized capital stock will consist of shares of common stock, par value $0.000005 per share, and shares of preferred stock, par value $0.0001 per share, all of which will be undesignated.

Common stock

As of September 30, 2018, assuming the conversion of all outstanding shares of our convertible preferred stock into 47,606,095 shares of our common stock upon the closing of this offering, we had outstanding 81,390,126 shares of common stock held of record by 121 stockholders.

Holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. An election of directors by our stockholders shall be determined by a plurality of the votes cast by the stockholders entitled to vote on the election. Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of any series of preferred stock that we may designate and issue in the future.

In the event of our liquidation or dissolution, the holders of our common stock are entitled to receive proportionately our net assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock. Holders of our common stock have no preemptive, subscription, redemption or conversion rights. Our outstanding shares of common stock are, and the shares offered by us in this offering will be, when issued and paid for, validly issued, fully paid and nonassessable. The rights, preferences and privileges of holders of common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

Preferred stock

As of September 30, 2018, there were 47,606,095 shares of our convertible preferred stock outstanding. Upon the closing of this offering, all outstanding shares of our convertible preferred stock will convert into 47,606,095 shares of our common stock.

Under the terms of our amended and restated certificate of incorporation that will go into effect upon the closing of this offering, our board of directors will be authorized to direct us to issue shares of preferred stock in one or more series without stockholder approval. Our board of directors has the discretion to determine the rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation preferences, of each series of preferred stock.

The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions, future financings and other corporate purposes, could have the effect of making it more difficult for a third-party to acquire, or could discourage a third-party from seeking to acquire, a majority of our outstanding voting stock. Upon the closing of this offering, there will be no shares of preferred stock outstanding, and we have no present plans to issue any shares of preferred stock.

Options

As of September 30, 2018, options to purchase shares of our common stock were outstanding under our 2015 Plan, of which options were vested as of that date, and options to purchase shares of our common stock were outstanding under our 2006 Plan, all of which options were vested as of that date.

Registration rights

Our investors' rights agreement grants the parties thereto certain registration rights in respect of the "registrable securities" held by them, which securities include (1) the shares of our common stock issued upon the conversion of shares of our convertible preferred stock, (2) the shares of our common stock issued to certain of our founders, and (3) any shares of our common stock issued as a dividend or other distribution with respect to the shares described in the foregoing clauses (1) and (2).

Demand registration rights

Upon the closing of this offering, certain holders of our registrable securities are entitled to demand registration rights. Under the terms of our investors' rights agreement, we will be required, upon the request of holders of at least 60% of our outstanding registrable securities issued or issuable upon conversion of our convertible preferred stock, to file a registration statement with an anticipated offering amount of at least $15.0 million and use our best efforts to effect the registration of these shares for public resale. We are required to effect up to three registrations pursuant to this provision of our investors' rights agreement. A demand for registration may not be made until six months after the effective date of the registration statement for which this prospectus forms a part.

Short form registration rights

Upon the closing of this offering, the holders of our registrable securities are also entitled to short form registration rights. Pursuant to our investors' rights agreement, if we are eligible to file a registration statement on Form S-3, upon the request of holders of at least 25% of our outstanding registrable securities to sell registrable securities with an anticipated aggregate offering amount of at least $1.0 million net of certain expenses related to the offering, we will be required to use our best efforts to effect a registration of such shares. We are required to effect up to two registrations in any 12-month period and no more than one registration in any four-month period pursuant to this provision of our investors' rights agreement.

Piggyback registration rights

The holders of our registrable securities are also entitled to piggyback registration rights. If we register any of our securities either for our own account or for the account of other security holders, the holders of our outstanding registrable securities are entitled to include their shares in the registration (other than a demand registration or a registration pursuant to a registration statement on Form S-4 or S-8). Subject to certain

exceptions contained in our investors' rights agreement, we and the underwriters may limit the number of shares included in an underwritten offering if the underwriters determine that marketing factors require a limitation of the number of shares to be underwritten.

Expenses and indemnification

Ordinarily, other than underwriting discounts and commissions, we will be required to pay all expenses incurred by us related to any registration effected pursuant to the exercise of these registration rights. These expenses may include all registration and filing fees, printing expenses, fees and disbursements of our counsel, reasonable fees and disbursements of a single counsel for the selling security holders and blue sky fees and expenses. Our investors' rights agreement also includes customary indemnification and procedural terms.

Termination of registration rights

The registration rights will expire on the earlier of (1) the date that is five years after the closing of this offering or (2) with respect to each stockholder following the closing of this offering, at such time as such stockholder holds 1% or less of our outstanding common stock and can sell all of its registrable securities without volume limitations pursuant to Rule 144 of the Securities Act during any three-month period.

Anti-takeover provisions

Some provisions of Delaware law and our amended and restated certificate of incorporation and our amended and restated bylaws that will go into effect upon the closing of this offering could make the following transactions more difficult: an acquisition of us by means of a tender offer; an acquisition of us by means of a proxy contest or otherwise; or the removal of our incumbent officers and directors. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interests or in our best interests, including transactions that provide for payment of a premium over the market price for our shares.

These provisions, summarized below, are intended to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of the increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Undesignated preferred stock

The ability of our board of directors, without action by our stockholders, to issue up to shares of undesignated preferred stock with voting or other rights or preferences as designated by our board of directors could impede the success of any attempt to effect a change in control of our company. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of our company.

Stockholder meetings

Our amended and restated bylaws will provide that a special meeting of stockholders may be called only by the chairman of our board of directors, our chief executive officer or president (in the absence of a chief executive officer), or by a resolution adopted by a majority of our board of directors.

Requirements for advance notification of stockholder nominations and proposals

Our amended and restated bylaws will establish advance notice procedures with respect to stockholder proposals to be brought before a stockholder meeting and the nomination of candidates for election as directors, other than nominations made by or at the direction of our board of directors or a committee of our board of directors.

Elimination of stockholder action by written consent

Our amended and restated certificate of incorporation will eliminate the right of stockholders to act by written consent without a meeting.

Staggered board

Our board of directors will be divided into three classes. The directors in each class will serve for a three-year term, with one class being elected each year by our stockholders. For more information on our classified board, see “Management—Board composition and election of directors.” This system of electing and removing directors may tend to discourage a third party from making a tender offer or otherwise attempting to obtain control of us, because it generally makes it more difficult for stockholders to replace a majority of the directors.

Removal of directors

Our amended and restated certificate of incorporation will provide that no member of our board of directors may be removed from office by our stockholders except for cause and, in addition to any other vote required by law, upon the approval of the holders of at least two-thirds in voting power of the outstanding shares of stock entitled to vote in the election of directors.

Stockholders not entitled to cumulative voting

Our amended and restated certificate of incorporation will not permit stockholders to cumulate their votes in the election of directors. Accordingly, the holders of a majority of the outstanding shares of our common stock entitled to vote in any election of directors will be able to elect all of the directors standing for election, if they choose, other than any directors that holders of our convertible preferred stock may be entitled to elect.

Choice of forum

Our amended and restated certificate of incorporation will provide that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for (1) any derivative action or proceeding brought on our behalf, (2) any action asserting a claim of breach of a fiduciary duty or other wrongdoing by any of our directors, officers, employees or agents to us or our stockholders, (3) any action asserting a claim against us arising pursuant to any provision of the General Corporation Law of the State of Delaware or our certificate of incorporation or bylaws, (4) any action to interpret, apply, enforce or determine the validity of our certificate of incorporation or bylaws, or (5) any action asserting a claim governed by the internal affairs doctrine. This provision would not apply to suits brought to enforce a duty or liability created by the Exchange Act. Our amended and restated certificate of incorporation will also provide that any person or entity holding, purchasing or otherwise acquiring any interest in shares of our capital stock will be deemed to have notice of and to have consented to this choice of forum provision. It is possible that a court of law could rule that the choice of forum provision contained in our amended and restated certificate of incorporation is inapplicable or unenforceable if it is challenged in a proceeding or

otherwise. Our amended and restated certificate will further provide that the federal district courts of the United States will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act.

Amendment of charter provisions

The amendment of any of the above provisions, except for the provision making it possible for our board of directors to issue preferred stock and the provision prohibiting cumulative voting, would require approval by holders of at least two-thirds in voting power of the outstanding shares of stock entitled to vote thereon.

Section 203 of the Delaware General Corporation Law

We are subject to Section 203 of the General Corporation Law of the State of Delaware, which prohibits persons deemed to be "interested stockholders" from engaging in a "business combination" with a publicly held Delaware corporation for three years following the date these persons become interested stockholders unless the business combination is, or the transaction in which the person became an interested stockholder was, approved in a prescribed manner or another prescribed exception applies. Generally, an "interested stockholder" is a person who, together with affiliates and associates, owns, or within three years prior to the determination of interested stockholder status did own, 15% or more of a corporation's voting stock. Generally, a "business combination" includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. The existence of this provision may have an anti-takeover effect with respect to transactions not approved in advance by our board of directors.

Limitations on liability and indemnification matters

Our amended and restated certificate of incorporation, which will go into effect upon the closing of this offering, will limit our directors' liability to the fullest extent permitted under Delaware law, which prohibits our amended and restated certificate of incorporation from limiting the liability of our directors for the following:

- any breach of the director's duty of loyalty to us or our stockholders;
- acts or omissions not in good faith or that involve intentional misconduct or a knowing violation of law;
- unlawful payment of dividends or unlawful stock repurchases or redemptions; or
- any transaction from which the director derived an improper personal benefit.

If Delaware law is amended to authorize corporate action further eliminating or limiting the personal liability of a director, then the liability of our directors will be eliminated or limited to the fullest extent permitted by Delaware law, as so amended. This limitation of liability does not apply to liabilities arising under the federal securities laws and does not affect the availability of equitable remedies such as injunctive relief or rescission.

Our amended and restated bylaws, which will go into effect upon the closing of this offering, will provide that we will indemnify our directors and officers to the fullest extent permitted under Delaware law and that we shall have the power to indemnify our employees and agents to the fullest extent permitted by law. Our amended and restated bylaws will also permit us to secure insurance on behalf of any officer, director, employee or other agent for any liability arising out of his or her actions in this capacity, regardless of whether we would have the power to indemnify such person against such expense, liability or loss under the General Corporation Law of the State of Delaware.

We have also entered into separate indemnification agreements with our directors and executive officers, in addition to indemnification provided for in our amended and restated bylaws. These agreements, among other

things, provide for indemnification of our directors and executive officers for expenses, judgments, fines and settlement amounts incurred by such persons in any action or proceeding arising out of this person's services as a director or executive officer or at our request. We believe that these provisions in our amended and restated certificate of incorporation and amended and restated bylaws and indemnification agreements are necessary to attract and retain qualified persons as directors and executive officers.

The above description of the limitation of liability and indemnification provisions of our amended and restated certificate of incorporation, our amended and restated bylaws and our indemnification agreements is not complete and is qualified in its entirety by reference to these documents, each of which will be filed as an exhibit to this registration statement to which this prospectus forms a part.

The limitation of liability and indemnification provisions in our amended and restated certificate of incorporation and amended and restated bylaws may discourage stockholders from bringing a lawsuit against our directors for breach of their fiduciary duties. They may also reduce the likelihood of derivative litigation against directors and officers, even though an action, if successful, might benefit us and our stockholders. A stockholder's investment may be harmed to the extent we pay the costs of settlement and damage awards against directors and officers pursuant to these indemnification provisions. Insofar as indemnification for liabilities under the Securities Act may be permitted to directors, officers or persons controlling us pursuant to the foregoing provisions, we have been informed that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable. There is no pending litigation or proceeding naming any of our directors or officers as to which indemnification is being sought, nor are we aware of any pending or threatened litigation that may result in claims for indemnification by any director or officer.

Listing

We intend to apply to list our common stock on The Nasdaq Global Market under the symbol " ."

Transfer agent and registrar

The transfer agent and registrar for our common stock will be .

Shares eligible for future sale

Immediately prior to this offering, there was no public market for our common stock, and no predictions can be made about the effect, if any, that market sales of our common stock or the availability of such shares for sale will have on the market price prevailing from time to time. Nevertheless, future sales of our common stock in the public market, or the perception that such sales may occur, could adversely affect the market price of our common stock and could impair our ability to raise capital through future sales of our securities. See “Risk factors—Risks related to this offering and owning our common stock—A significant portion of our total outstanding shares is restricted from immediate resale but may be sold into the market in the near future, which could cause the market price of our common stock to decline significantly, even if our business is doing well.” Furthermore, although we intend to apply to have our common stock listed on the Nasdaq Global Market, we cannot assure you that there will be an active public trading market for our common stock.

Upon the closing of this offering, based on the number of shares of our common stock outstanding as of September 30, 2018 and after giving effect to the automatic conversion of all outstanding shares of our convertible preferred stock into 47,606,095 shares of our common stock upon the closing of this offering, and assuming no exercise of options after September 30, 2018, we will have an aggregate of shares of our common stock outstanding (or shares of our common stock if the underwriters exercise in full their option to purchase additional shares). Of these shares of our common stock, all of the shares sold in this offering (or shares if the underwriters exercise in full their option to purchase additional shares) will be freely tradable without restriction or further registration under the Securities Act, except for any shares purchased by our “affiliates,” as that term is defined in Rule 144 under the Securities Act, whose sales would be subject to the Rule 144 resale restrictions described below, other than the holding period requirement.

The remaining shares of our common stock will be “restricted securities,” as that term is defined in Rule 144 under the Securities Act. These restricted securities are eligible for public sale only if they are registered under the Securities Act or if they qualify for an exemption from registration under Rules 144 or 701 under the Securities Act, which are summarized below. We expect that substantially all of these shares will be subject to the 180-day lock-up period under the lock-up agreements described below. Upon expiration of the lock-up period, we estimate that approximately shares of our common stock will be available for sale in the public market, subject in some cases to applicable volume limitations under Rule 144.

Lock-up agreements

We and each of our directors and executive officers and holders of substantially all of our outstanding capital stock, who will collectively own shares of our common stock upon the closing of this offering (after giving effect to the automatic conversion of all outstanding shares of our convertible preferred stock into shares of our common stock upon the closing of this offering), have agreed not to sell or transfer any common stock or securities convertible into, exchangeable for, exercisable for or repayable with common stock, for 180 days after the date of this prospectus without first obtaining the written consent of J.P. Morgan Securities LLC, Goldman Sachs & Co. LLC and Jefferies LLC.

Upon the expiration of the lock-up period, substantially all of the shares subject to such lock-up restrictions will become eligible for sale, subject to the limitations discussed above. For a further description of these lock-up agreements, see “Underwriting.”

Rule 144

Affiliate resales of restricted securities

In general, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, a person who is an affiliate of ours, or who was an affiliate at any time during the 90 days before a sale, who has beneficially owned shares of our common stock for at least six months would be entitled to sell in "broker's transactions" or certain "riskless principal transactions" or to market makers, a number of shares within any three-month period that does not exceed the greater of:

- 1% of the number of shares of our common stock then outstanding, which will equal approximately shares of our common stock immediately after this offering; or
- the average weekly trading volume in shares of our common stock on the Nasdaq Global Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale.

Affiliate resales under Rule 144 are also subject to the availability of current public information about us. In addition, if the number of shares being sold under Rule 144 by an affiliate during any three-month period exceeds 5,000 shares or has an aggregate sale price in excess of $50,000, the seller must file a notice on Form 144 with the SEC and Nasdaq concurrently with either the placing of a sale order with the broker or the execution directly with a market maker.

Non-affiliate resales of restricted securities

In general, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, a person who is not an affiliate of ours at the time of sale, and has not been an affiliate at any time during the three months preceding a sale, and who has beneficially owned shares of our common stock for at least six months but less than a year, is entitled to sell such shares subject only to the availability of current public information about us. If such person has held our shares for at least one year, such person can resell under Rule 144(b)(1) without regard to any Rule 144 restrictions, including the 90-day public company requirement and the current public information requirement.

Non-affiliate resales are not subject to the manner of sale, volume limitation or notice filing provisions of Rule 144.

Rule 701

In general, under Rule 701, any of an issuer's employees, directors, officers, consultants or advisors who purchases shares from the issuer in connection with a compensatory stock or option plan or other written agreement before the effective date of a registration statement under the Securities Act is entitled to sell such shares 90 days after such effective date in reliance on Rule 144. An affiliate of the issuer can resell shares in reliance on Rule 144 without having to comply with the holding period requirement, and non-affiliates of the issuer can resell shares in reliance on Rule 144 without having to comply with the current public information and holding period requirements.

The SEC has indicated that Rule 701 will apply to typical options granted by an issuer before it becomes subject to the reporting requirements of the Exchange Act, along with the shares acquired upon exercise of such options, including exercises after an issuer becomes subject to the reporting requirements of the Exchange Act.

Equity plans

We intend to file one or more registration statements on Form S-8 under the Securities Act to register all shares of our common stock subject to outstanding options and shares of our common stock issued or issuable under

our incentive plans. We expect to file the registration statement covering shares offered pursuant to our incentive plans shortly after the date of this prospectus, permitting the resale of such shares by non-affiliates in the public market without restriction under the Securities Act and the sale by affiliates in the public market, subject to compliance with the resale provisions of Rule 144.

Registration rights

Upon the closing of this offering, the holders of 67,870,173 shares of our common stock (including shares of our common stock issuable upon the conversion of all outstanding shares of our convertible preferred stock upon the closing of this offering) or their transferees will be entitled to various rights with respect to the registration of these shares under the Securities Act. Registration of these shares under the Securities Act would result in these shares becoming fully tradable without restriction under the Securities Act immediately upon the effectiveness of the registration, except for shares purchased by affiliates. See “Description of capital stock—Registration rights” for additional information. Shares covered by a registration statement will be eligible for sale in the public market upon the expiration or release from the terms of any applicable lock-up agreement.

Material U.S. federal income tax consequences to Non-U.S. Holders

The following discussion is a summary of the material U.S. federal income tax consequences to Non-U.S. Holders (as defined below) of the purchase, ownership and disposition of our common stock issued pursuant to this offering, but does not purport to be a complete analysis of all potential tax effects. The effects of other U.S. federal tax laws, such as estate and gift tax laws, and any applicable state, local or non-U.S. tax laws are not discussed. This discussion is based on the U.S. Internal Revenue Code of 1986, as amended, or the Code, Treasury Regulations promulgated thereunder, judicial decisions, and published rulings and administrative pronouncements of the U.S. Internal Revenue Service, or the IRS, in each case in effect as of the date hereof. These authorities may change or be subject to differing interpretations. Any such change or differing interpretation may be applied retroactively in a manner that could adversely affect a Non-U.S. Holder of our common stock. We have not sought and will not seek any rulings from the IRS regarding the matters discussed below. There can be no assurance the IRS or a court will not take a contrary position to that discussed below regarding the tax consequences of the purchase, ownership and disposition of our common stock.

This discussion is limited to Non-U.S. Holders that hold our common stock as a “capital asset” within the meaning of Section 1221 of the Code (generally, property held for investment). This discussion does not address all U.S. federal income tax consequences relevant to a Non-U.S. Holder’s particular circumstances, including the impact of the Medicare contribution tax on net investment income or the alternative minimum tax. In addition, it does not address consequences relevant to Non-U.S. Holders subject to special rules, including, without limitation:

- U.S. expatriates and former citizens or long-term residents of the United States;
- persons holding our common stock as part of a hedge, straddle or other risk reduction strategy or as part of a conversion transaction or other integrated investment;
- banks, insurance companies, and other financial institutions;
- brokers, dealers or traders in securities;
- “controlled foreign corporations,” “passive foreign investment companies,” and corporations that accumulate earnings to avoid U.S. federal income tax;
- partnerships or other entities or arrangements treated as partnerships for U.S. federal income tax purposes (and investors therein);
- tax-exempt organizations or governmental organizations;
- persons deemed to sell our common stock under the constructive sale provisions of the Code;
- persons who hold or receive our common stock pursuant to the exercise of any employee stock option or otherwise as compensation;
- tax-qualified retirement plans;
- “qualified foreign pension funds” as defined in Section 897(l)(2) of the Code and entities all of the interests of which are held by qualified foreign pension funds;
- persons who own, or are deemed to own, more than 5% of our capital stock (except to the extent specifically set forth below); and
- persons subject to special tax accounting rules as a result of any item of gross income with respect to the stock being taken into account in an applicable financial statement.

If an entity treated as a partnership for U.S. federal income tax purposes holds our common stock, the tax treatment of a partner in the partnership will depend on the status of the partner, the activities of the partnership and certain determinations made at the partner level. Accordingly, partnerships (or other entities treated as a partnership for U.S. federal income tax purposes) holding our common stock and the partners in such partnerships or other entities should consult their tax advisors regarding the U.S. federal income tax consequences to them.

THIS DISCUSSION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TAX ADVICE. INVESTORS SHOULD CONSULT THEIR TAX ADVISORS WITH RESPECT TO THE APPLICATION OF THE U.S. FEDERAL INCOME TAX LAWS TO THEIR PARTICULAR SITUATIONS AS WELL AS ANY TAX CONSEQUENCES OF THE PURCHASE, OWNERSHIP AND DISPOSITION OF OUR COMMON STOCK ARISING UNDER THE U.S. FEDERAL ESTATE OR GIFT TAX LAWS OR UNDER THE LAWS OF ANY STATE, LOCAL OR NON-U.S. TAXING JURISDICTION OR UNDER ANY APPLICABLE INCOME TAX TREATY.

Definition of a Non-U.S. Holder

For purposes of this discussion, a “Non-U.S. Holder” is any beneficial owner of our common stock that is neither a “U.S. person” nor an entity treated as a partnership for U.S. federal income tax purposes.

A U.S. person is any person that, for U.S. federal income tax purposes, is or is treated as any of the following:

- an individual who is a citizen or resident of the United States;
- a corporation, or an entity treated as a corporation, created or organized under the laws of the United States, any state thereof, or the District of Columbia;
- an estate, the income of which is subject to U.S. federal income tax regardless of its source; or
- a trust that (1) is subject to the primary supervision of a U.S. court and the control of one or more “United States persons” (within the meaning of Section 7701(a)(30) of the Code), or (2) has a valid election in effect to be treated as a United States person for U.S. federal income tax purposes.

Distributions

As described in the section entitled “Dividend policy,” we do not anticipate declaring or paying dividends to holders of our common stock in the foreseeable future. However, if we do make distributions of cash or property on our common stock, such distributions will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. Amounts not treated as dividends for U.S. federal income tax purposes will constitute a return of capital and will first be applied against and reduce a Non-U.S. Holder’s adjusted tax basis in our common stock, but not below zero. Any excess will be treated as capital gain and will be treated as described below under “—Sale or other taxable dispositions of common stock.”

Subject to the discussion below on effectively connected income, dividends paid to a Non-U.S. Holder of our common stock will be subject to U.S. federal withholding tax at a rate of 30% of the gross amount of the dividends (or such lower rate specified by an applicable income tax treaty, provided the Non-U.S. Holder timely furnishes a valid IRS Form W-8BEN or W-8BEN-E (or other applicable documentation) certifying qualification for the lower treaty rate). A Non-U.S. Holder that does not timely furnish the required documentation, but that qualifies for a reduced treaty rate, may obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. Non-U.S. Holders should consult their tax advisors regarding their entitlement to benefits under any applicable income tax treaty.

If dividends paid to a Non-U.S. Holder are effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the Non-U.S. Holder maintains a permanent establishment in the United States to which such dividends are attributable), the Non-U.S. Holder will be exempt from the U.S. federal withholding tax described above. To claim the exemption, the Non-U.S. Holder must timely furnish to the applicable withholding agent a valid IRS Form W-8ECI (or applicable successor form), certifying that the dividends are effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States.

Any such effectively connected dividends will be subject to U.S. federal income tax on a net income basis at the regular graduated rates. A Non-U.S. Holder that is a corporation also may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected dividends, as adjusted for certain items. Non-U.S. Holders should consult their tax advisors regarding any applicable tax treaties that may provide for different rules.

Sales or other taxable dispositions of common stock

A Non-U.S. Holder will not be subject to U.S. federal income tax on any gain realized upon the sale or other taxable disposition of our common stock unless:

- the gain is effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the Non-U.S. Holder maintains a permanent establishment in the United States to which such gain is attributable);
- the Non-U.S. Holder is a nonresident alien individual present in the United States for 183 days or more during the taxable year of the disposition and certain other requirements are met; or
- our common stock constitutes a U.S. real property interest, or USRPI, by reason of our status as a U.S. real property holding corporation, or USRPHC, for U.S. federal income tax purposes.

Gain described in the first bullet point above generally will be subject to U.S. federal income tax on a net income basis at the regular graduated rates. A Non-U.S. Holder that is a corporation also may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected gain, as adjusted for certain items.

Gain described in the second bullet point above will be subject to U.S. federal income tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty), which may be offset by U.S. source capital losses of the Non-U.S. Holder (even though the individual is not considered a resident of the United States), provided the Non-U.S. Holder has timely filed U.S. federal income tax returns with respect to such losses.

With respect to the third bullet point above, we believe we currently are not, and do not anticipate becoming, a USRPHC. Generally, a corporation is a U.S. real property holding corporation only if the fair market value of its U.S. real property interests equals or exceeds 50% of the sum of the fair market value of its worldwide real property interests plus its other assets used or held for use in a trade or business. Because the determination of whether we are a USRPHC depends, however, on the fair market value of our USRPIs relative to the fair market value of our non-U.S. real property interests and our other business assets, there can be no assurance we currently are not a USRPHC or will not become one in the future. Even if we are or were to become a USRPHC, gain arising from the sale or other taxable disposition by a Non-U.S. Holder of our common stock will not be subject to U.S. federal income tax if our common stock is "regularly traded," as defined by applicable Treasury Regulations, on an established securities market, and such Non-U.S. Holder owned, actually and constructively, 5% or less of our common stock throughout the shorter of the five-year period ending on the date of the sale or other taxable disposition or the Non-U.S. Holder's holding period.

Non-U.S. Holders should consult their tax advisors regarding potentially applicable income tax treaties that may provide for different rules.

Information reporting and backup withholding

Payments of dividends on our common stock will not be subject to backup withholding, provided the applicable withholding agent does not have actual knowledge or reason to know the holder is a United States person and the holder either certifies its non-U.S. status, such as by furnishing a valid IRS Form W-8BEN, W-8BEN-E or W-8ECI, or otherwise establishes an exemption. However, information returns are required to be filed with the IRS in connection with any dividends on our common stock paid to the Non-U.S. Holder, regardless of whether any tax was actually withheld.

In addition, proceeds of the sale or other taxable disposition of our common stock within the United States, or conducted through certain U.S.-related brokers generally will not be subject to backup withholding or information reporting, if the applicable withholding agent receives the certification described above and does not have actual knowledge or reason to know that such holder is a United States person, or the holder otherwise establishes an exemption. Proceeds of a disposition of our common stock conducted through a non-U.S. office of a non-U.S. broker generally will not be subject to backup withholding or information reporting. Non-U.S. holders should consult their tax advisors regarding the application of the information reporting and backup withholding rules to them.

Copies of information returns that are filed with the IRS may also be made available under the provisions of an applicable treaty or agreement to the tax authorities of the country in which the Non-U.S. Holder resides or is established.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules may be allowed as a refund or a credit against a Non-U.S. Holder's U.S. federal income tax liability, provided the required information is timely furnished to the IRS.

Additional withholding tax on payments made to foreign accounts

Withholding taxes may be imposed under Sections 1471 to 1474 of the Code (such Sections commonly referred to as the Foreign Account Tax Compliance Act, or FATCA) on certain types of payments made to non-U.S. financial institutions and certain other non-U.S. entities. Specifically, a 30% withholding tax may be imposed on dividends on, or gross proceeds from the sale or other disposition of, our common stock paid to a "foreign financial institution" or a "non-financial foreign entity" (each as defined in the Code), unless (1) the foreign financial institution undertakes certain diligence and reporting obligations, (2) the non-financial foreign entity either certifies it does not have any "substantial United States owners" (as defined in the Code) or furnishes identifying information regarding each substantial United States owner, or (3) the foreign financial institution or non-financial foreign entity otherwise qualifies for an exemption from these rules. If the payee is a foreign financial institution and is subject to the diligence and reporting requirements in (1) above, it must enter into an agreement with the U.S. Department of the Treasury requiring, among other things, that it undertake to identify accounts held by certain "specified United States persons" or "United States-owned foreign entities" (each as defined in the Code), annually report certain information about such accounts, and withhold 30% on certain payments to non-compliant foreign financial institutions and certain other account holders. Foreign financial institutions located in jurisdictions that have an intergovernmental agreement with the United States governing FATCA may be subject to different rules.

Under the applicable Treasury Regulations and administrative guidance, withholding under FATCA generally applies to payments of dividends on our common stock, and will apply to payments of gross proceeds from the sale or other disposition of such stock on or after January 1, 2019.

Prospective investors should consult their tax advisors regarding the potential application of withholding under FATCA to their investment in our common stock.

Underwriting

We are offering the shares of common stock described in this prospectus through a number of underwriters. J.P. Morgan Securities LLC, Goldman Sachs & Co. LLC, Jefferies LLC and Barclays Capital Inc. are acting as joint book-running managers of the offering and as representatives of the underwriters. We have entered into an underwriting agreement with the underwriters. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriters, and each underwriter has severally agreed to purchase, at the public offering price less the underwriting discounts and commissions set forth on the cover page of this prospectus, the number of shares of common stock listed next to its name in the following table:

Name	Number of shares
J.P. Morgan Securities LLC	
Goldman Sachs & Co. LLC	
Jefferies LLC	
Barclays Capital Inc.	
Total	

The underwriters are committed to purchase all the shares of common stock offered by us if they purchase any shares. The underwriting agreement also provides that if an underwriter defaults, the purchase commitments of non-defaulting underwriters may also be increased or the offering may be terminated.

The underwriters propose to offer the common stock directly to the public at the initial public offering price set forth on the cover page of this prospectus and to certain dealers at that price less a concession not in excess of $ per share. Any such dealers may resell shares to certain other brokers or dealers at a discount of up to $ per share from the initial public offering price. After the initial offering of the shares to the public, if all of the shares of common stock are not sold at the initial public offering price, the underwriters may change the offering price and the other selling terms. Sales of shares made outside of the United States may be made by affiliates of the underwriters.

The underwriters have an option to buy up to additional shares of common stock from us to cover sales of shares by the underwriters which exceed the number of shares specified in the table above. The underwriters have 30 days from the date of this prospectus to exercise this option to purchase additional shares. If any shares are purchased with this option to purchase additional shares, the underwriters will purchase shares in approximately the same proportion as shown in the table above. If any additional shares of common stock are purchased, the underwriters will offer the additional shares on the same terms as those on which the shares are being offered.

The underwriting fee is equal to the public offering price per share of common stock less the amount paid by the underwriters to us per share of common stock. The underwriting fee is $ per share. The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters assuming both no exercise and full exercise of the underwriters' option to purchase additional shares.

	Without option to purchase additional shares exercise	With full option to purchase additional shares exercise
Per Share	$	$
Total	$	$

We estimate that the total expenses of this offering, including registration, filing and listing fees, printing fees and legal and accounting expenses, but excluding the underwriting discounts and commissions, will be approximately $. We have agreed to reimburse the underwriters for expenses relating to the clearance of this offering with the Financial Industry Regulatory Authority, Inc. in an amount up to $.

A prospectus in electronic format may be made available on the web sites maintained by one or more underwriters, or selling group members, if any, participating in the offering. The underwriters may agree to allocate a number of shares to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the representatives to underwriters and selling group members that may make Internet distributions on the same basis as other allocations.

We have agreed that, subject to certain exceptions, we will not (1) offer, pledge, announce the intention to sell, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase or otherwise dispose of, directly or indirectly, or file with, the SEC a registration statement under the Securities Act relating to, any shares of our common stock or securities convertible into or exchangeable or exercisable for any shares of our common stock, or publicly disclose the intention to make any offer, sale, pledge, disposition or filing, or (2) enter into any swap or other arrangement that transfers all or a portion of the economic consequences associated with the ownership of any shares of common stock or any such other securities (regardless of whether any of these transactions are to be settled by the delivery of shares of common stock or such other securities, in cash or otherwise), in each case without the prior written consent of J.P. Morgan Securities LLC, Goldman Sachs & Co. LLC and Jefferies LLC for a period of 180 days after the date of this prospectus.

Our directors and executive officers, and substantially all of our securityholders have entered into lock-up agreements with the underwriters prior to the commencement of this offering pursuant to which each of these persons or entities, with limited exceptions, for a period of 180 days after the date of this prospectus, may not, without the prior written consent of J.P. Morgan Securities LLC, Goldman Sachs & Co. LLC and Jefferies LLC (1) offer, pledge, announce the intention to sell, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for our common stock (including, without limitation, common stock or such other securities which may be deemed to be beneficially owned by such directors, executive officers, managers and members in accordance with the rules and regulations of the SEC and securities which may be issued upon exercise of a stock option or warrant) or (2) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the common stock or such other securities, whether any such transaction described in clause (1) or (2) above is to be settled by delivery of common stock or such other securities, in cash or otherwise, or (3) make any demand for or exercise any right with respect to the registration of any shares of our common stock or any security convertible into or exercisable or exchangeable for our common stock.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act.

We intend to apply to have our common stock approved for listing on The Nasdaq Global Market under the symbol “ .”

In connection with this offering, the underwriters may engage in stabilizing transactions, which involves making bids for, purchasing and selling shares of common stock in the open market for the purpose of preventing or retarding a decline in the market price of the common stock while this offering is in progress. These stabilizing transactions may include making short sales of the common stock, which involves the sale by the underwriters

of a greater number of shares of common stock than they are required to purchase in this offering, and purchasing shares of common stock on the open market to cover positions created by short sales. Short sales may be “covered” shorts, which are short positions in an amount not greater than the underwriters’ option to purchase additional shares referred to above, or may be “naked” shorts, which are short positions in excess of that amount. The underwriters may close out any covered short position either by exercising their option to purchase additional shares, in whole or in part, or by purchasing shares in the open market. In making this determination, the underwriters will consider, among other things, the price of shares available for purchase in the open market compared to the price at which the underwriters may purchase shares through the option to purchase additional shares. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the common stock in the open market that could adversely affect investors who purchase in this offering. To the extent that the underwriters create a naked short position, they will purchase shares in the open market to cover the position.

The underwriters have advised us that, pursuant to Regulation M of the Securities Act, they may also engage in other activities that stabilize, maintain or otherwise affect the price of the common stock, including the imposition of penalty bids. This means that if the representatives of the underwriters purchase common stock in the open market in stabilizing transactions or to cover short sales, the representatives can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them.

These activities may have the effect of raising or maintaining the market price of the common stock or preventing or retarding a decline in the market price of the common stock, and, as a result, the price of the common stock may be higher than the price that otherwise might exist in the open market. If the underwriters commence these activities, they may discontinue them at any time. The underwriters may carry out these transactions on The Nasdaq Global Market, in the over-the-counter market or otherwise.

Prior to this offering, there has been no public market for our common stock. The initial public offering price will be determined by negotiations between us and the representatives of the underwriters. In determining the initial public offering price, we and the representatives of the underwriters expect to consider a number of factors including:

- the information set forth in this prospectus and otherwise available to the representatives;
- our prospects and the history and prospects for the industry in which we compete;
- an assessment of our management;
- our prospects for future earnings;
- the general condition of the securities markets at the time of this offering;
- the recent market prices of, and demand for, publicly traded common stock of generally comparable companies; and
- other factors deemed relevant by the underwriters and us.

Neither we nor the underwriters can assure investors that an active trading market will develop for our common shares, or that the shares will trade in the public market at or above the initial public offering price.

Other relationships

The underwriters and their respective affiliates are full service financial institutions engaged in various activities, which may include sales and trading, commercial and investment banking, advisory, investment

management, investment research, principal investment, hedging, market making, brokerage and other financial and non-financial activities and services. Certain of the underwriters and their respective affiliates have provided, and may in the future provide, a variety of these services to us and to persons and entities with relationships with us, for which they received or will receive customary fees and expenses.

In the ordinary course of their various business activities, the underwriters and their respective affiliates, officers, directors and employees may purchase, sell or hold a broad array of investments and actively trade securities, derivatives, loans, commodities, currencies, credit default swaps and other financial instruments for their own account and for the accounts of their customers, and such investment and trading activities may involve or relate to assets, securities and/or instruments of ours (directly, as collateral securing other obligations or otherwise) and/or persons and entities with relationships with us, including long or short positions in our debt or equity securities or loans. The underwriters and their respective affiliates may also communicate independent investment recommendations, market color or trading ideas and/or publish or express independent research views in respect of such assets, securities or instruments and may at any time hold, or recommend to clients that they should acquire, long and/or short positions in such assets, securities and instruments.

Selling restrictions

Other than in the United States, no action has been taken by us or the underwriters that would permit a public offering of the securities offered by this prospectus in any jurisdiction where action for that purpose is required. The securities offered by this prospectus may not be offered or sold, directly or indirectly, nor may this prospectus or any other offering material or advertisements in connection with the offer and sale of any such securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons into whose possession this prospectus comes are advised to inform themselves about and to observe any restrictions relating to the offering and the distribution of this prospectus. This prospectus does not constitute an offer to sell or a solicitation of an offer to buy any securities offered by this prospectus in any jurisdiction in which such an offer or a solicitation is unlawful.

Notice to prospective investors in the European Economic Area

In relation to each Member State of the European Economic Area which has implemented the Prospectus Directive, (each, a “Relevant Member State”), with effect from and including the date on which the Prospectus Directive is implemented in that Relevant Member State, no offer of shares may be made to the public in that Relevant Member State other than:

(1) to any legal entity which is a qualified investor as defined in the Prospectus Directive;

(2) to fewer than 150 natural or legal persons (other than qualified investors as defined in the Prospectus Directive), subject to obtaining the prior consent of the underwriters; or

(3) in any other circumstances falling within Article 3(2) of the Prospectus Directive,

provided that no such offer of shares shall require the Company or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Directive or supplement a prospectus pursuant to Article 16 of the Prospectus Directive and each person who initially acquires any shares or to whom any offer is made will be deemed to have represented, acknowledged and agreed to and with each of the underwriters and the Company that it is a “qualified investor” within the meaning of the law in that Relevant Member State implementing Article 2(1)(e) of the Prospectus Directive.

In the case of any shares being offered to a financial intermediary as that term is used in Article 3(2) of the Prospectus Directive, each such financial intermediary will be deemed to have represented, acknowledged and agreed that the shares acquired by it in the offer have not been acquired on a non-discretionary basis on behalf of, nor have they been acquired with a view to their offer or resale to, persons in circumstances which may give rise to an offer of any shares to the public other than their offer or resale in a Relevant Member State to qualified investors as so defined or in circumstances in which the prior consent of the representatives has been obtained to each such proposed offer or resale.

For the purposes of this provision, the expression an “offer of shares to the public” in relation to any shares in any Relevant Member State means the communication in any form and by means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase shares, as the same may be varied in that Member State by any measure implementing the Prospectus Directive in that Member State, the expression “Prospectus Directive” means Directive 2003/71/EC (as amended, including by Directive 2010/73/EU), and includes any relevant implementing measure in the Relevant Member State.

Notice to prospective investors in the United Kingdom

In addition, in the United Kingdom, this document is being distributed only to, and is directed only at, and any offer subsequently made may only be directed at persons who are “qualified investors” (as defined in the Prospectus Directive) (1) who have professional experience in matters relating to investments falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended (the “Order”) and/or (2) who are high net worth companies (or persons to whom it may otherwise be lawfully communicated) falling within Article 49(2)(a) to (d) of the Order (all such persons together being referred to as “relevant persons”) or otherwise in circumstances which have not resulted and will not result in an offer to the public of the shares in the United Kingdom within the meaning of the Financial Services and Markets Act 2000.

Any person in the United Kingdom that is not a relevant person should not act or rely on the information included in this document or use it as basis for taking any action. In the United Kingdom, any investment or investment activity that this document relates to may be made or taken exclusively by relevant persons.

Notice to prospective investors in Canada

The shares may be sold only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 Prospectus Exemptions or subsection 73.3(1) of the Securities Act (Ontario), and are permitted clients, as defined in National Instrument 31-103 Registration Requirements, Exemptions and Ongoing Registrant Obligations. Any resale of the shares must be made in accordance with an exemption from, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser’s province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser’s province or territory for particulars of these rights or consult with a legal advisor.

Pursuant to section 3A.3 of National Instrument 33-105 Underwriting Conflicts, or NI 33-105, the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

Notice to prospective investors in Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange, or the SIX, or on any other stock exchange or regulated trading facility in Switzerland. This document does not constitute a prospectus within the meaning of, and has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the Company or the shares has been or will be filed with or approved by any Swiss regulatory authority. In particular, this document will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA, and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes, or the CISA. The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

Notice to prospective investors in the Dubai International Financial Centre (“DIFC”)

This document relates to an Exempt Offer in accordance with the Markets Rules 2012 of the Dubai Financial Services Authority, or the DFSA. This document is intended for distribution only to persons of a type specified in the Markets Rules 2012 of the DFSA. It must not be delivered to, or relied on by, any other person. The DFSA has no responsibility for reviewing or verifying any documents in connection with Exempt Offers. The DFSA has not approved this prospectus supplement nor taken steps to verify the information set forth herein and has no responsibility for this document. The securities to which this document relates may be illiquid and/or subject to restrictions on their resale. Prospective purchasers of the securities offered should conduct their own due diligence on the securities. If you do not understand the contents of this document you should consult an authorized financial advisor.

In relation to its use in the DIFC, this document is strictly private and confidential and is being distributed to a limited number of investors and must not be provided to any person other than the original recipient, and may not be reproduced or used for any other purpose. The interests in the securities may not be offered or sold directly or indirectly to the public in the DIFC.

Notice to prospective investors in the United Arab Emirates

The shares have not been, and are not being, publicly offered, sold, promoted or advertised in the United Arab Emirates (including the Dubai International Financial Centre) other than in compliance with the laws of the United Arab Emirates (and the Dubai International Financial Centre) governing the issue, offering and sale of securities. Further, this prospectus does not constitute a public offer of securities in the United Arab Emirates (including the Dubai International Financial Centre) and is not intended to be a public offer. This prospectus has not been approved by or filed with the Central Bank of the United Arab Emirates, the Securities and Commodities Authority or the Dubai Financial Services Authority.

Notice to prospective investors in Australia

This prospectus:

- does not constitute a product disclosure document or a prospectus under Chapter 6D.2 of the Corporations Act 2001 (Cth), or the Corporations Act;

- has not been, and will not be, lodged with the Australian Securities and Investments Commission, or ASIC, as a disclosure document for the purposes of the Corporations Act and does not purport to include the information required of a disclosure document under Chapter 6D.2 of the Corporations Act;
- does not constitute or involve a recommendation to acquire, an offer or invitation for issue or sale, an offer or invitation to arrange the issue or sale, or an issue or sale, of interests to a "retail client" (as defined in section 761G of the Corporations Act and applicable regulations) in Australia; and
- may only be provided in Australia to select investors who are able to demonstrate that they fall within one or more of the categories of investors, or Exempt Investors, available under section 708 of the Corporations Act.

The shares may not be directly or indirectly offered for subscription or purchased or sold, and no invitations to subscribe for or buy the shares may be issued, and no draft or definitive offering memorandum, advertisement or other offering material relating to any shares may be distributed in Australia, except where disclosure to investors is not required under Chapter 6D of the Corporations Act or is otherwise in compliance with all applicable Australian laws and regulations. By submitting an application for the shares, you represent and warrant to us that you are an Exempt Investor.

As any offer of shares under this document will be made without disclosure in Australia under Chapter 6D.2 of the Corporations Act, the offer of those securities for resale in Australia within 12 months may, under section 707 of the Corporations Act, require disclosure to investors under Chapter 6D.2 if none of the exemptions in section 708 applies to that resale. By applying for the shares you undertake to us that you will not, for a period of 12 months from the date of issue of the shares, offer, transfer, assign or otherwise alienate those securities to investors in Australia except in circumstances where disclosure to investors is not required under Chapter 6D.2 of the Corporations Act or where a compliant disclosure document is prepared and lodged with ASIC.

Notice to prospective investors in Japan

The shares have not been and will not be registered pursuant to Article 4, Paragraph 1 of the Financial Instruments and Exchange Act. Accordingly, none of the shares nor any interest therein may be offered or sold, directly or indirectly, in Japan or to, or for the benefit of, any "resident" of Japan (which term as used herein means any person resident in Japan, including any corporation or other entity organized under the laws of Japan), or to others for re-offering or resale, directly or indirectly, in Japan or to or for the benefit of a resident of Japan, except pursuant to an exemption from the registration requirements of, and otherwise in compliance with, the Financial Instruments and Exchange Act and any other applicable laws, regulations and ministerial guidelines of Japan in effect at the relevant time.

Notice to prospective investors in Hong Kong

The shares have not been offered or sold and will not be offered or sold in Hong Kong, by means of any document, other than (1) to "professional investors" as defined in the Securities and Futures Ordinance (Cap. 571) of Hong Kong and any rules made under that Ordinance or (2) in other circumstances which do not result in the document being a "prospectus" as defined in the Companies (Winding Up and Miscellaneous Provisions) Ordinance (Cap. 32) of Hong Kong or which do not constitute an offer to the public within the meaning of that Ordinance. No advertisement, invitation or document relating to the shares has been or may be issued or has been or may be in the possession of any person for the purposes of issue, whether in Hong Kong or elsewhere, which is directed at, or the contents of which are likely to be accessed or read by, the public of Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to shares which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" as defined in the Securities and Futures Ordinance and any rules made under that Ordinance.

Notice to prospective investors in Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (1) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore, or the SFA, (2) to a relevant person pursuant to Section 275(1), or any person pursuant to Section 275(1A), and in accordance with the conditions specified in Section 275 of the SFA, or (3) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

(a) a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or

(b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor,

securities (as defined in Section 239(1) of the SFA) of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares pursuant to an offer made under Section 275 of the SFA except:

(a) to an institutional investor or to a relevant person defined in Section 275(2) of the SFA, or to any person arising from an offer referred to in Section 275(1A) or Section 276(4)(i)(B) of the SFA;

(b) where no consideration is or will be given for the transfer;

(c) where the transfer is by operation of law;

(d) as specified in Section 276(7) of the SFA; or

(e) as specified in Regulation 32 of the Securities and Futures (Offers of Investments) (Shares and Debentures) Regulations 2005 of Singapore.

Notice to prospective investors in Bermuda

Shares may be offered or sold in Bermuda only in compliance with the provisions of the Investment Business Act of 2003 of Bermuda which regulates the sale of securities in Bermuda. Additionally, non-Bermudian persons (including companies) may not carry on or engage in any trade or business in Bermuda unless such persons are permitted to do so under applicable Bermuda legislation.

Notice to prospective investors in Saudi Arabia

This document may not be distributed in the Kingdom of Saudi Arabia except to such persons as are permitted under the Offers of Securities Regulations as issued by the board of the Saudi Arabian Capital Market Authority, or the CMA, pursuant to resolution number 2-11-2004 dated 4 October 2004 as amended by resolution number 1-28-2008, as amended, or the CMA Regulations. The CMA does not make any representation as to the accuracy or completeness of this document and expressly disclaims any liability whatsoever for any loss arising from, or incurred in reliance upon, any part of this document. Prospective purchasers of the securities offered hereby should conduct their own due diligence on the accuracy of the information relating to the securities. If you do not understand the contents of this document, you should consult an authorised financial adviser.

Notice to prospective investors in the British Virgin Islands

The shares are not being, and may not be offered to the public or to any person in the British Virgin Islands for purchase or subscription by or on behalf of the Company. The Company may be offered to companies incorporated under the BVI Business Companies Act, 2004 (British Virgin Islands), but only where the offer will be made to, and received by, the relevant BVI Company entirely outside of the British Virgin Islands. This prospectus has not been, and will not be, registered with the Financial Services Commission of the British Virgin Islands. No registered prospectus has been or will be prepared in respect of the shares for the purposes of the Securities and Investment Business Act, 2010 or the Public Issuers Code of the British Virgin Islands.

Notice to prospective investors in China

This prospectus does not constitute a public offer of shares, whether by sale or subscription, in the People's Republic of China, or the PRC. The shares are not being offered or sold directly or indirectly in the PRC to or for the benefit of, legal or natural persons of the PRC.

Further, no legal or natural persons of the PRC may directly or indirectly purchase any of the shares or any beneficial interest therein without obtaining all prior PRC's governmental approvals that are required, whether statutorily or otherwise. Persons who come into possession of this document are required by the issuer and its representatives to observe these restrictions.

Notice to prospective investors in Korea

The shares have not been and will not be registered under the Financial Investments Services and Capital Markets Act of Korea and the decrees and regulations thereunder, or the FSCMA, and the shares have been and will be offered in Korea as a private placement under the FSCMA. None of the shares may be offered, sold or delivered directly or indirectly, or offered or sold to any person for re-offering or resale, directly or indirectly, in Korea or to any resident of Korea except pursuant to the applicable laws and regulations of Korea, including the FSCMA and the Foreign Exchange Transaction Law of Korea and the decrees and regulations thereunder, or the FETL. Furthermore, the purchaser of the shares shall comply with all applicable regulatory requirements (including but not limited to requirements under the FETL) in connection with the purchase of the shares. By the purchase of the shares, the relevant holder thereof will be deemed to represent and warrant that if it is in Korea or is a resident of Korea, it purchased the shares pursuant to the applicable laws and regulations of Korea.

Notice to prospective investors in Malaysia

No prospectus or other offering material or document in connection with the offer and sale of the shares has been or will be registered with the Securities Commission of Malaysia, or the Commission, for the Commission's approval pursuant to the Capital Markets and Services Act 2007. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Malaysia other than (1) a closed end fund approved by the Commission, (2) a holder of a Capital Markets Services Licence, (3) a person who acquires the shares, as principal, if the offer is on terms that the shares may only be acquired at a consideration of not less than RM250,000 (or its equivalent in foreign currencies) for each transaction, (4) an individual whose total net personal assets or total net joint assets with his or her spouse exceeds RM3 million (or its equivalent in foreign currencies), excluding the value of the primary residence of the individual, (5) an individual who has a gross annual income exceeding RM300,000 (or its equivalent in foreign currencies) per

annum in the preceding 12 months, (6) an individual who, jointly with his or her spouse, has a gross annual income of RM400,000 (or its equivalent in foreign currencies), per annum in the preceding 12 months, (7) a corporation with total net assets exceeding RM10 million (or its equivalent in a foreign currencies) based on the last audited accounts, (8) a partnership with total net assets exceeding RM10 million (or its equivalent in foreign currencies), (9) a bank licensee or insurance licensee as defined in the Labuan Financial Services and Securities Act 2010, (10) an Islamic bank licensee or takaful licensee as defined in the Labuan Financial Services and Securities Act 2010, and (11) any other person as may be specified by the Commission; provided that, in the each of the preceding categories (1) to (11), the distribution of the shares is made by a holder of a Capital Markets Services Licence who carries on the business of dealing in securities. The distribution in Malaysia of this prospectus is subject to Malaysian laws. This prospectus does not constitute and may not be used for the purpose of public offering or an issue, offer for subscription or purchase, invitation to subscribe for or purchase any securities requiring the registration of a prospectus with the Commission under the Capital Markets and Services Act 2007.

Notice to prospective investors in Taiwan

The shares have not been and will not be registered with the Financial Supervisory Commission of Taiwan pursuant to relevant securities laws and regulations and may not be sold, issued or offered within Taiwan through a public offering or in circumstances which constitutes an offer within the meaning of the Securities and Exchange Act of Taiwan that requires a registration or approval of the Financial Supervisory Commission of Taiwan. No person or entity in Taiwan has been authorised to offer, sell, give advice regarding or otherwise intermediate the offering and sale of the shares in Taiwan.

Notice to prospective investors in South Africa

Due to restrictions under the securities laws of South Africa, the shares are not offered, and the offer shall not be transferred, sold, renounced or delivered, in South Africa or to a person with an address in South Africa, unless one or other of the following exemptions applies:

(1) the offer, transfer, sale, renunciation or delivery is to:

(a) persons whose ordinary business is to deal in securities, as principal or agent;

(b) the South African Public Investment Corporation;

(c) persons or entities regulated by the Reserve Bank of South Africa;

(d) authorised financial service providers under South African law;

(e) financial institutions recognised as such under South African law;

(f) a wholly-owned subsidiary of any person or entity contemplated in (c), (d) or (e), acting as agent in the capacity of an authorised portfolio manager for a pension fund or collective investment scheme (in each case duly registered as such under South African law); or

(g) any combination of the person in (a) to (f); or

(2) the total contemplated acquisition cost of the securities, for any single addressee acting as principal is equal to or greater than ZAR1,000,000.

No “offer to the public” (as such term is defined in the South African Companies Act, No. 71 of 2008 (as amended or re-enacted), or the South African Companies Act, in South Africa is being made in connection with

the issue of the shares. Accordingly, this document does not, nor is it intended to, constitute a “registered prospectus” (as that term is defined in the South African Companies Act) prepared and registered under the South African Companies Act and has not been approved by, and/or filed with, the South African Companies and Intellectual Property Commission or any other regulatory authority in South Africa. Any issue or offering of the shares in South Africa constitutes an offer of the shares in South Africa for subscription or sale in South Africa only to persons who fall within the exemption from “offers to the public” set out in section 96(1)(a) of the South African Companies Act. Accordingly, this document must not be acted on or relied on by persons in South Africa who do not fall within section 96(1)(a) of the South African Companies Act (such persons being referred to as “SA Relevant Persons”). Any investment or investment activity to which this document relates is available in South Africa only to SA Relevant Persons and will be engaged in South Africa only with SA relevant persons.

Legal matters

The validity of the shares of common stock offered hereby and certain other legal matters will be passed upon for us by Smith, Anderson, Blount, Dorsett, Mitchell & Jernigan, LLP, Raleigh, North Carolina, and certain other legal matters will be passed upon for us by Latham & Watkins LLP. Certain legal matters in connection with this offering will be passed upon for the underwriters by Cooley LLP, New York, New York.

Experts

The financial statements included in this prospectus have been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report appearing herein. Such financial statements are included in reliance upon the report of such firm given upon their authority as experts in accounting and auditing.

Where you can find more information

We have filed with the SEC a registration statement on Form S-1 under the Securities Act with respect to the shares of common stock offered hereby. This prospectus, which constitutes a part of the registration statement, does not contain all of the information set forth in the registration statement or the exhibits and schedules filed therewith. For further information about us and the common stock offered hereby, we refer you to the registration statement and the exhibits and schedules filed therewith. Statements contained in this prospectus regarding the contents of any contract or any other document that is filed as an exhibit to the registration statement are not necessarily complete, and each such statement is qualified in all respects by reference to the full text of such contract or other document filed as an exhibit to the registration statement. Upon completion of this offering, we will be required to file periodic reports, proxy statements, and other information with the SEC pursuant to the Exchange Act. You may read and copy this information at the Public Reference Room of the SEC, 100 F Street, N.E., Room 1580, Washington, D.C. 20549. You may obtain information on the operation of the public reference room by calling the SEC at 1-800-SEC-0330. The SEC also maintains an Internet website that contains reports, proxy statements and other information about registrants, like us, that file electronically with the SEC. The address of that site is www.sec.gov.

Precision BioSciences, Inc.
Index to consolidated financial statements

Report of independent registered public accounting firm

To the stockholders and the Board of Directors of Precision BioSciences, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Precision BioSciences, Inc. (the “Company”) as of December 31, 2017 and 2016, the related consolidated statements of operations, changes in stockholders’ deficit and cash flows, for each of the two years in the period ended December 31, 2017, and the related notes (collectively referred to as the “financial statements”). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2017 and 2016, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2017, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB and in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits, we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company’s internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Deloitte & Touche LLP

Raleigh, North Carolina
October 18, 2018

We have served as the Company’s auditor since 2016.

Precision BioSciences, Inc.
Consolidated balance sheets

(In thousands, except share and per share amounts)	December 31, 2016	December 31, 2017
Assets		
Current assets:		
Cash and cash equivalents	$ 93,423	$ 62,802
Prepaid expenses and other current assets	979	1,529
Total current assets	94,402	64,331
Property, equipment, and software—net	3,544	8,137
Intangible assets—net	281	90
Other assets	187	124
Total assets	$ 98,414	$ 72,682
Liabilities and Stockholders' Deficit		
Current liabilities:		
Accounts payable	$ 1,286	$ 1,806
Accrued expenses and other current liabilities	823	1,573
Deferred revenue	6,209	5,824
Deferred rent	22	—
Total current liabilities	8,340	9,203
Deferred revenue—noncurrent	94,390	88,596
Deferred rent—noncurrent	433	1,252
Total liabilities	103,163	99,051
Commitments and contingencies (Note 9)		
Stockholders' deficit:		
Series A convertible preferred stock; $0.0001 par value—25,650,000 shares authorized; 25,650,000 shares issued and outstanding	3	3
Common stock; $0.000005 par value—100,000,000 shares authorized; 35,132,923 shares issued and outstanding at December 31, 2016; 35,215,548 shares issued and 33,485,443 shares outstanding at December 31, 2017	—	—
Additional paid-in capital	13,257	13,691
Accumulated deficit	(18,009)	(39,111)
Treasury stock (at cost, 0 and 1,730,105 shares of common stock at December 31, 2016 and 2017, respectively)	—	(952)
Total stockholders' deficit	(4,749)	(26,369)
Total liabilities and stockholders' deficit	$ 98,414	$ 72,682

See notes to consolidated financial statements

Precision BioSciences, Inc.
Consolidated statements of operations

(In thousands, except share and per share amounts)	Years ended December 31, 2016	2017
Revenue	$ 7,015	$ 6,484
Operating expenses:		
Research and development	9,675	20,324
General and administrative	6,168	8,016
Impairment of intangible assets	—	118
Total operating expenses	15,843	28,458
Loss from operations	(8,828)	(21,974)
Other income:		
Interest income	570	872
Other income	2	—
Total other income	572	872
Loss before income tax expense	(8,256)	(21,102)
Income tax benefit	(5)	—
Net loss and net loss attributable to common stockholders	$ (8,251)	$ (21,102)
Net loss per share attributable to common stockholders-basic and diluted	$ (0.24)	$ (0.62)
Weighted-average shares of common stock outstanding-basic and diluted	34,825,334	33,956,010
Pro forma net loss per share attributable to common stockholders-basic and diluted (unaudited)		
Pro forma weighted-average shares of common stock outstanding-basic and diluted (unaudited)		

See notes to consolidated financial statements

Precision BioSciences, Inc.
Consolidated statements of changes in stockholders' deficit

(In thousands, except share amounts)	Series A convertible preferred stock		Common stock		Additional paid-in capital	Accumulated deficit	Treasury stock	Total stockholders' equity (deficit)
	Shares	Amount	Shares	Amount				
Balance—January 1, 2016	25,650,000	$ 3	34,352,512	$ —	$ 25,473	$ (9,758)	$ —	$ 15,718
Return of capital to Series A preferred stockholders	—	—	—	—	(12,425)	—	—	(12,425)
Stock option exercises	—	—	705,411	—	49	—	—	49
Issuance of restricted common stock	—	—	75,000	—	—	—	—	—
Share-based compensation expense	—	—	—	—	160	—	—	160
Net loss	—	—	—	—	—	(8,251)	—	(8,251)
Balance—December 31, 2016	25,650,000	$ 3	35,132,923	$ —	$ 13,257	$ (18,009)	$ —	$ (4,749)
Repurchase of common stock	—	—	—	—	—	—	(952)	(952)
Stock option exercises	—	—	82,625	—	15	—	—	15
Share-based compensation expense	—	—	—	—	419	—	—	419
Net loss	—	—	—	—	—	(21,102)	—	(21,102)
Balance—December 31, 2017	25,650,000	$ 3	35,215,548	$ —	$ 13,691	$ (39,111)	$ (952)	$ (26,369)

See notes to consolidated financial statements

Precision BioSciences, Inc.
Consolidated statements of cash flows

(In thousands)	Years ended December 31, 2016	2017
Cash flows from operating activities:		
Net loss	$ (8,251)	$ (21,102)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:		
Depreciation and amortization	640	1,435
Share-based compensation	160	419
Loss on disposal of assets	9	56
Impairment of intangible assets	—	118
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	(354)	(550)
Other assets	(29)	63
Accounts payable	82	864
Accrued expenses and other current liabilities	767	707
Deferred revenue	99,250	(6,179)
Net cash provided by (used in) operating activities	92,274	(24,169)
Cash flows from investing activities:		
Acquired intellectual property	(260)	—
Proceeds from disposal of equipment	—	50
Purchases of property, equipment, and software	(1,815)	(5,565)
Net cash used in investing activities	(2,075)	(5,515)
Cash flows from financing activities:		
Return of capital to Series A preferred stockholders	(12,425)	—
Repurchases of common stock	—	(952)
Proceeds from stock option exercises	49	15
Net cash used in financing activities	(12,376)	(937)
Net increase (decrease) in cash and cash equivalents	77,823	(30,621)
Cash and cash equivalents—beginning of period	15,600	93,423
Cash and cash equivalents—end of period	$ 93,423	$ 62,802
Supplemental disclosures of noncash financing and investing activities:		
Property, equipment and software additions included in accounts payable and accrued expenses and other current liabilities	$ 563	$ 218

See notes to consolidated financial statements

Precision BioSciences, Inc.
Notes to consolidated financial statements

Note 1: Description of business and summary of significant accounting policies

Description of business and basis of presentation

Precision BioSciences, Inc. (the “Company”) was incorporated on January 26, 2006 under the laws of the State of Delaware and is based in Durham, North Carolina. The Company is focused on utilizing its proprietary genome editing platform to help overcome cancers, cure genetic diseases and enable the development of safer, more productive food sources.

The Company’s 100% owned subsidiary, Precision PlantSciences, Inc., was incorporated on January 4, 2012. Precision PlantSciences, Inc. amended its certificate of incorporation on January 16, 2018 to change its name to ELO Life Systems, Inc. The accompanying consolidated financial statements include the accounts of the Company and ELO Life Systems, Inc. Intercompany balances and transactions have been eliminated in consolidation.

Since its inception, the Company has devoted substantially all of its efforts to research and development activities, recruiting skilled personnel, developing manufacturing processes, establishing our intellectual property portfolio and providing general and administrative support for these operations. The Company is subject to a number of risks similar to those of other companies conducting high-risk, early-stage research and development of product candidates. Principal among these risks are dependence on key individuals and intellectual property, competition from other products and companies and the technical risks associated with the successful research, development and clinical manufacturing of its and its collaborators’ product candidates. The Company’s success is dependent upon its ability to continue to raise additional capital in order to fund ongoing research and development, obtain regulatory approval of its products, successfully commercialize its products, generate revenue, meet its obligations and, ultimately, attain profitable operations.

Use of estimates

The preparation of consolidated financial statements in conformity with accounting principles generally accepted in the United States of America (“GAAP”) requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and disclosures made in the accompanying notes to the consolidated financial statements. Actual results could differ from those estimates. Significant estimates include recording revenue for multiple element arrangements, determination of the fair value of share-based compensation grants and estimating services expended by third-party service providers used to recognize research and development expense.

Basis of presentation

These financial statements have been prepared in accordance with GAAP. Additionally, the accompanying consolidated financial statements have been prepared on a going concern basis, which contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. To date, the Company has not generated any revenue from product sales and does not expect to generate any revenue from the sale of product in the foreseeable future. During the year ended December 31, 2017, the Company incurred a net loss of $21.1 million and, as of December 31, 2017, has a $39.1 million accumulated deficit. The Company has financed operations to date primarily through the issuance of preferred stock (see Note 6) and with proceeds from its development and commercial license agreement with Les Laboratoires Servier (“Servier”) (see Note 13). The Company expects to incur additional operating losses and negative operating cash flows for the foreseeable future.

Precision BioSciences, Inc.
Notes to consolidated financial statements

Management believes that existing cash and cash equivalents will allow the Company to continue its operations for at least a year from the issuance date of these consolidated financial statements. In the absence of a significant source of recurring revenue, the continued viability of the Company beyond that point is dependent on its ability to continue to raise additional capital to finance its operations. There can be no assurance that the Company will be able to obtain sufficient capital to cover its costs on acceptable terms, if at all.

Cash and cash equivalents

The Company considers all highly liquid investments with an original maturity of three months or less at the date of purchase to be cash equivalents. As of December 31, 2016 and 2017, the Company held cash equivalents composed of money market funds and repurchase agreements that were collateralized by deposits in the form of government securities and obligations.

Concentrations of credit risk

Financial instruments that potentially subject the Company to concentrations of credit risk consist principally of cash and cash equivalents. All of the Company's cash and cash equivalents are held at financial institutions that management believes to be of high credit quality. The Company may maintain cash deposits in financial institutions in excess of government insured limits. The Company regularly invests excess cash deposits in money market funds and repurchase agreements. The Company believes that the credit risk arising from the holdings of these financial instruments is mitigated by the fact that these securities are of short duration, government backed and of high credit rating. The Company has not experienced any losses on cash and cash equivalents to date.

Revenue from two development and license agreements accounted for 69% and 22% of revenue during 2016 and 89% and 6% of revenue during 2017.

Property, equipment and software

Property, equipment, and software are stated at cost, net of depreciation and amortization. Depreciation and amortization are calculated using the straight-line method over the estimated useful lives of the assets ranging from three to seven years. Leasehold improvements are amortized on a straight-line basis over the shorter of the lease term or estimated useful life of the asset.

The depreciation and amortization periods for the Company's significant property, equipment and software categories are as follows:

Computer hardware and software	3 years
Lab equipment	5 to 7 years
Furniture and office equipment	3 to 5 years
Leasehold improvements	Lesser of remaining lease term or useful life

Repairs and maintenance are charged to operations as incurred, and expenditures for additions and improvements that extend the useful life of the asset are capitalized.

Precision BioSciences, Inc.
Notes to consolidated financial statements

Impairment of long-lived assets

Long-lived assets, such as property, equipment and software and intangible assets, subject to amortization, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. An impairment loss is assessed when future undiscounted cash flows are less than the assets' carrying value and recognized when the carrying value of the asset exceeds fair value. Fair value is calculated by estimating the undiscounted future cash flows expected to be generated by the asset as well as other valuation techniques. An impairment charge is recognized for the amount by which the carrying amount exceeds the fair value of the asset.

Revenue recognition

The Company's revenues are generated primarily through collaborative research, license, development and commercialization agreements. The terms of these agreements generally contain multiple elements, or deliverables, which may include (i) licenses, or options to obtain licenses, to the Company's technology, (ii) research and development activities to be performed on behalf of the collaborative partner, and (iii) in certain cases, services in connection with the manufacturing of pre-clinical and clinical material. Payments to the Company under these arrangements typically include one or more of the following: non-refundable, upfront license fees; option exercise fees; funding of research and/or development efforts; clinical and development, regulatory, and sales milestone payments; and royalties on future product sales.

Revenue is recognized when all of the following conditions are met: (i) persuasive evidence of an arrangement exists, (ii) delivery has occurred or services have been rendered, (iii) fees are fixed or determinable and (iv) collection of fees is reasonably assured.

The Company analyzes its collaboration arrangements to assess whether they are within the scope of Accounting Standards Codification *808, Collaborative Arrangements* ("ASC 808") to determine whether such arrangements involve joint operating activities performed by parties that are both active participants in the activities and exposed to significant risks and rewards dependent on the commercial success of such activities. This requires the Company to determine whether elements of the collaboration are deemed to be within the scope of ASC 808 and those that are more reflective of a vendor-customer relationship and therefore within the scope of Accounting Standards Codification *605-25, Revenue Recognition—Multiple-Element Arrangements* ("ASC 605"). To date, the Company has no arrangements that are within the scope of ASC 808.

When evaluating multiple element arrangements under ASC 605, the Company determines whether the arrangement should be divided into separate units of accounting and how the arrangement consideration should be measured and allocated among the separate units of accounting. An element qualifies as a separate unit of accounting when the delivered element has stand-alone value to the customer. Any delivered elements that do not qualify as separate units of accounting are combined with other undelivered elements within the arrangement as a single unit of accounting. The Company determines the revenue recognition method for the combined unit of accounting and recognizes the revenue over the period from inception through the date the last deliverable within the single unit of accounting is delivered. The Company's arrangements do not include a general right of return relative to delivered elements.

Amounts received prior to satisfying all revenue recognition criteria are recorded as deferred revenue in the accompanying consolidated balance sheets. The Company's deferred revenue includes nonrefundable up-front

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license fees. The deferred revenue is recognized into revenue on a proportional or straight-line basis over the estimated period of the Company's substantive performance obligations or the period the rights granted are in effect. Analyzing the arrangement to identify deliverables requires the use of judgment and each deliverable may be an obligation to deliver services, a right or a license to use an asset or some other performance obligation.

In arrangements that include license rights and other noncontingent deliverables, these deliverables do not have stand-alone value because the noncontingent deliverables are dependent on the license rights, are not sold separately and cannot be resold. In addition, when noncontingent deliverables are sold with up-front license rights, the sale of license rights do not represent the culmination of a separate earnings process. As such, the Company accounts for the license and the noncontingent deliverables as a single unit of accounting. In such instances, the license revenue in the form of nonrefundable up-front payments is deferred and recognized over the applicable relationship period, which historically has been the estimated period of the Company's substantive performance obligations or the period the rights granted are in effect.

The Company will recognize clinical and development, regulatory, and sales milestone payments as revenue when earned if they are substantive and the Company has no ongoing performance obligations related to the milestone payment. A milestone payment is considered substantive if it i) is commensurate with either the Company's performance to achieve the milestone or the enhanced value of the delivered item as a result of a specific outcome from the Company's performance to achieve the milestone; ii) relates solely to past performance; and iii) is reasonable relative to all of the deliverables and payment terms, including other potential milestone consideration, within the arrangement.

Royalties earned on product sales, if any, are recognized based on contractual terms of the agreement when reported sales are reliably measurable and collectibility is reasonably assured, provided that there are no performance obligations then remaining. To date, none of the Company's product candidates have been approved or commercialized, and therefore, the Company has not earned any royalty revenue from product sales.

In the event that an agreement was to be terminated and the Company had no further performance obligations at that time, the Company would recognize as revenue at the date of such termination any portion of the non-refundable upfront payment and other payments that had not previously been recorded as revenue and were classified as deferred revenue at the date of such termination.

Research and development

Research and development costs are expensed as incurred. Research and development expenses are comprised of costs incurred in performing research and development activities including salaries, benefits, share-based compensation, allocations for rent and facility costs, depreciation, preclinical manufacturing expenses, costs of services provided by contract research organizations ("CROs") in connection with preclinical trials and contract manufacturing organizations ("CMOs") engaged to manufacture clinical trial material, costs of licensing technology, and costs of services provided by research organizations and service providers. Upfront payments and milestone payments made for the licensing of technology are expensed as research and development in the period in which they are incurred. Nonrefundable advance payments for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses. The prepaid amounts are expensed as the related goods are delivered or the services are performed rather than when the payment is made.

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The Company is required to estimate accrued research and development expenses resulting from its obligations under contracts with CROs, CMOs, research organizations, service providers, vendors and consultants in connection with research and development activities. The financial terms of these contracts are subject to negotiations and vary from contract to contract and may result in payment flows that do not match the periods over which materials or services are provided to the Company under such contracts. The Company's objective is to reflect the appropriate research and development expenses in its consolidated financial statements by matching those expenses with the period in which the services and efforts are expended. There may be instances in which payments made to the Company's vendors will exceed the level of services provided and result in a prepayment of the expense. In accruing fees, the Company estimates the time period over which services will be performed and the level of effort to be expended in each period. If the actual timing of the performance of services or the level of effort varies from the Company's estimate, the Company adjusts the accrual or amount of prepaid expense accordingly. Accrued amounts are disclosed in Note 5.

Although the Company does not expect its estimates to be materially different from amounts actually incurred, the Company's understanding of the status and timing of services performed relative to the actual status and timing of services performed may vary and may result in the Company reporting amounts that are too high or too low in any particular period. To date, the Company has not made any material adjustments to prior estimates of accrued research and development expenses.

Common stock valuation

Due to the absence of an active market for the Company's common stock, the Company utilized methodologies in accordance with the framework of the American Institute of Certified Public Accountants Technical Practice Aid, Valuation of Privately-Held Company Equity Securities Issued as Compensation, to estimate the fair value of its common stock. In determining the exercise prices for stock options granted, the Company has considered the estimated fair value of the common stock as of the measurement date. The estimated fair value of the common stock has been determined based upon a variety of factors, including the illiquid nature of the common stock, the Company's financial position and historical financial performance, the status of technological developments within the Company's research, the composition and ability of the current research and management team, an evaluation or benchmark of the Company's competition and the current business climate in the marketplace. Significant changes to the key assumptions underlying the factors used could result in different fair values of common stock at each valuation date.

Net loss per share

Basic net loss per share is computed by dividing net loss attributable to common stockholders by the weighted-average number of shares of common stock outstanding during the period. Diluted net loss per share is computed using the weighted-average number of shares of common stock outstanding during the period and, if dilutive, the weighted-average number of potential shares of common stock. Diluted net loss per share is the same as basic net loss per share for the years ended December 31, 2016 and 2017 since all potential shares of common stock instruments are anti-dilutive as a result of the net loss.

The Company's convertible preferred stock contractually entitles the holders of such shares to participate in dividends but does not contractually require the holders of such shares to participate in losses of the Company. Accordingly, in periods in which the Company reports a net loss, such losses are not allocated to such participating securities. In periods in which the Company reports a net loss attributable to common

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stockholders, diluted net loss per share attributable to common stockholders is the same as basic net loss per share attributable to common stockholders, since dilutive shares of common stock are not assumed to have been issued if their effect is anti-dilutive. The Company reported a net loss attributable to common stockholders for the years ended December 31, 2016 and 2017.

Share-based compensation

Employees—The Company determines the fair value of stock options issued to employees as of the grant date. Share-based compensation expense equal to the grant-date fair value of the stock options is recognized over the requisite service period, which is equal to the vesting period.

Nonemployees—For nonemployees, the Company also determines the fair value of stock options as of the grant date. Share-based compensation expense equal to the grant-date fair value of the stock options is recognized over the requisite service period, which is equal to the vesting period.

Income taxes

Deferred tax assets and liabilities are determined based on the temporary differences between the consolidated financial statement carrying amounts and the tax basis of assets and liabilities using the enacted tax rates in effect in the years in which the differences are expected to reverse. In estimating future tax consequences, all expected future events are considered other than the enactment of changes in the tax law or rates. Changes in deferred tax assets and liabilities are recorded in the provision for income taxes.

The Company may recognize the tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities based on the technical merits of the position. The tax benefits recognized in the consolidated financial statements from such a position is measured based on the largest benefit that has a greater than 50% likelihood of being realized upon ultimate settlement.

The Company assesses the likelihood that its deferred tax assets will be recovered from future taxable income and, to the extent it believes, based upon the weight of available evidence, that it is more likely than not that all or a portion of the deferred tax assets will not be realized, a valuation allowance is established through a charge to income tax expense. Potential for recovery of deferred tax assets is evaluated by estimating the future taxable profits expected and considering prudent and feasible tax planning strategies.

Recent accounting pronouncements not yet adopted

The Company is an “emerging growth company,” as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act, and may take advantage of reduced reporting requirements that are otherwise applicable to public companies. Section 107 of the JOBS Act exempts emerging growth companies from being required to comply with new or revised financial accounting standards until private companies are required to comply with those standards. The Company has elected to use the extended transition period for complying with new or revised accounting standards; and as a result of this election, its financial statements may not be comparable to companies that comply with public company effective dates. The JOBS Act also exempts the Company from having to provide an auditor attestation of internal controls over financial reporting under Sarbanes-Oxley Act Section 404(b).

The Company will remain an “emerging growth company” until the earliest of (a) the last day of the fiscal year in which it has total annual gross revenues of $1.07 billion or more, (b) the last day of the fiscal year following

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the fifth anniversary of the completion of its IPO, (c) the date on which it has issued more than $1.0 billion in nonconvertible debt during the previous three years or (d) the date on which it is deemed to be a large accelerated filer under the SEC, which generally is when it has more than $700 million in market value of our stock held by non-affiliates, been a public company for at least 12 months and have filed one annual report on Form 10-K.

In May 2014, the Financial Accounting Standards Board, or FASB, issued Accounting Standards Update ("ASU"), No. 2014-09, Revenue (Topic 606): Revenue from Contracts with Customers ("ASU 2014-09"), which will replace existing revenue recognition standards and significantly expand the disclosure requirements for revenue arrangements. The new standard and the subsequent amendments, which are codified in ASC 606, will be effective for the Company beginning on January 1, 2019. The Company is in the process of evaluating the impact of the adoption of ASC 606 on its consolidated financial statements. The Company will continue to assess the potential impact that ASC 606 may have on its financial position and results of operations as it relates to the Company's February 2016 development and commercial license agreement with Servier (see Note 13 to the consolidated financial statements). The Company's initial assessment is that revenue recognition under the February 2016 development and commercial license agreement with Servier for the up-front payment and certain development milestones related to early-stage activities that are nonsubstantive, less fees to exercise the codevelopment and copromotion option may not be materially different under ASC 606 as compared to ASC 605. Further, the Company's initial assessment of revenue for development milestones that are considered substantive under this agreement is that they be recognized over time when the amount of the milestone can be reasonably be estimated without a significant reversal under ASC 606. The actual quantitative effects of the adoption of ASU 2014-09 is subject to change pending the Company's final assessment in the first quarter of 2019.

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*, in order to improve comparability among organizations by recognizing lease assets and liabilities in the consolidated balance sheets for those leases previously classified as operating leases under GAAP. The update requires a lessee to recognize in its consolidated balance sheet a liability to make lease payments and also a right-of-use asset representing its right to use the underlying asset for the lease term. ASU 2016-02 is effective for the Company for annual periods beginning after December 15, 2019 and early adoption is permitted. The Company is evaluating the impact of adoption of this standard on the consolidated financial statements.

In March 2016, the FASB issued ASU No. 2016-09, *Compensation—Stock Compensation: Improvements to Employee Share-Based Payment Accounting* ("ASU 2016-09"), which amends ASC 718, *Compensation—Stock Compensation*. The amendments simplify several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, forfeitures, and classification in the consolidated statements of cash flows. ASU 2016-09 is effective for the Company for annual periods beginning after December 15, 2017 and early adoption is permitted. The Company is currently evaluating the potential impact of the adoption of this standard on its consolidated financial statements. The Company plans to elect to account for the impact of pre-vesting forfeitures as they occur rather than applying an estimated forfeiture rate and to adopt this standard using the modified retrospective adoption method. No material changes are expected to the Company's consolidated financial statements as a result of the adoption of this standard.

In May 2017, the FASB issued ASU No. 2017-09, *Compensation-Stock Compensation*, or ASU 2017-09. The new guidance is an update to ASC 718 and simplifies the modification accounting for share-based payment awards.

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ASU 2017-09 is effective for annual periods beginning after December 15, 2017. The Company is evaluating the impact of the adoption of this standard but does not believe it will have a material effect on the Company's consolidated financial statements.

Note 2: Prepaid expenses and other current assets

Prepaid expenses and other current assets consisted of the following as of December 31 (in thousands):

	2016	2017
Deferred rent asset	$ —	$ 70
Noncustomer receivables	386	22
Prepaid expenses	593	1,437
Total prepaid expenses and other current assets	$979	$1,529

Note 3: Property, equipment and software

Property, equipment and software consisted of the following as of December 31 (in thousands):

	2016	2017
Construction in progress	$ 270	$ 12
Leasehold improvements	1,723	4,541
Software	55	86
Laboratory equipment	2,888	5,370
Office equipment	296	570
Furniture and fixtures	204	751
Total property, equipment and software	5,436	11,330
Less accumulated depreciation and amortization	1,892	3,193
Property, equipment and software—net	$3,544	$ 8,137

Depreciation expense, including amortization of leasehold improvements and software, was $0.6 million and $1.4 million for the years ended December 31, 2016 and 2017, respectively.

Note 4: Intangible assets

Acquired patents

The Company licensed patents from Duke University ("Duke") as part of a license agreement in exchange for consideration including an upfront payment of $0.2 million and reimbursement of legal fees to maintain and defend the patents. The patents are being amortized on a straight-line basis over 273 months, which is the expected useful life of the patents.

The Company licensed limited-use patents for a fee of $0.3 million and a term of 36 months to test the licensors' intellectual property in association with the Company's technology platform. The Company performed an evaluation of its intangible assets for purposes of determining possible impairment as of December 31, 2017 and determined that, based on its research experiments with the licensor's intellectual property, it will not pursue further development of the intellectual property. As a result, the Company recognized an impairment charge of $0.1 million for the year ended December 31, 2017.

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Intangible assets, net, consisted of the following as of December 31 (in thousands):

	2016	2017
License cost	$ 431	$ 431
Less: accumulated amortization	(150)	(223)
Less: impairments	—	(118)
Intangible assets, net	$ 281	$ 90

Amortization expense of the intangible assets was $0.1 million for the years ended December 31, 2016 and 2017.

Note 5: Accrued expenses and other current liabilities

Accrued expenses and other current liabilities consisted of the following as of December 31 (in thousands):

	2016	2017
Accrued compensation	$416	$ 983
Accrued research and development expenses	—	500
Tax withholding for return of capital to Series A preferred stockholders	219	—
Other	188	90
Total accrued expenses and other current liabilities	$823	$1,573

Note 6: Stockholders' deficit

Capital structure

In April 2015, the Company amended and restated its certificate of incorporation and authorized 125,650,000 shares, of which 100,000,000 shares were designated as $0.000005 par value common stock and 25,650,000 shares were designated as $0.0001 par value Series A preferred stock.

In May 2018, the Company amended and restated its certificate of incorporation and authorized 177,606,100 shares, of which 130,000,000 shares were designated as $0.000005 par value common stock, 25,650,000 shares were designated as $0.0001 par value Series A preferred stock, and 21,956,100 shares were designated as $0.0001 par value Series B preferred stock.

Preferred Stock

In 2015, the Company issued 25,650,000 shares of Series A preferred stock for gross proceeds of $25.7 million and incurred stock issuance costs of $0.3 million. The Series A preferred stock shares were sold for $1.00 per share (the "Series A Original Issue Price").

Upon issuance, the Series A preferred stock accrued dividends at $0.06 per share annually, could be converted into common stock on a share-for-share basis, and had liquidation preference over the common stock. In December 2016, the Company paid $12.4 million (net of transaction expenses) based on fair value as a return of capital to the Series A preferred stockholders to remove the preferred stock's liquidation and dividend preferences and certain conversion rights. The Company recorded the return of capital as a decrease in paid-in capital.

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From May 2018 to July 2018, the Company issued 21,956,100 shares of its Series B preferred stock and received approximately $110.0 million in gross proceeds, less $0.2 million in aggregate offering costs. The Series B preferred stock shares were sold for $5.01 per share (the “Series B Original Issue Price”, together with the Series A Original Issue Price, the “Original Issue Price”).

The rights and privileges of the Series A and Series B preferred stockholders include the following:

Conversion—Each share of Series A and Series B preferred stock may be converted at any time, at the option of the holder, into shares of common stock. Each share of the Series A and Series B preferred stock will be automatically converted into shares of common stock, at the applicable conversion rate then in effect, upon the earlier of (i) the closing of an initial public offering of the Company’s common stock at a price of at least $6.01 per share and with net proceeds of at least $50.0 million, subject to adjustment as set forth in the Company’s amended and restated certificate of incorporation (a “Qualified IPO”), (ii) in connection with any stock split, stock dividend, combination or other similar events and (iii) in accordance with anti-dilution provisions.

The conversion rate of the Series A and Series B preferred stock is determined by dividing the Original Issue Price by the conversion price for each series of stock. The initial conversion price for the Series A and Series B preferred stock is the Original Issue Price of $1.00 per share and $5.01 per share, respectively, subject to appropriate adjustment in the event of any stock split, stock dividend, combination or other similar recapitalization and other adjustments as set forth in the Company’s amended and restated certificate of incorporation.

Voting Rights—Preferred stock and common stock vote together as one class on an as-converted basis. Holders are entitled to vote on all matters and shall have the number of votes equal to the number of shares of common stock into which the shares of preferred stock held by such holder are then convertible. The Company cannot perform any of the following actions without a vote of approval from at least 60% of outstanding preferred stockholders: execute a liquidation event, amend the Company’s certificate of incorporation in a manner detrimental to Series A and Series B preferred stockholders, create or amend any securities to be senior to the Series A and Series B preferred stockholders, issue or increase the amount of common shares, or change the size of the board of directors. The Company’s board of directors is currently comprised of four directors: two designated by the common stockholders and two designated by the preferred stock stockholders. The remaining three directors, none of whom may have any affiliation with any class of stockholder, will be designated by the four common and preferred designees.

Dividends—No classes of stock are entitled to receive dividends unless preferred stockholders first receive dividends on outstanding shares in an amount at least equal to the amount of dividends payable to the other classes of stock. The preferred shares do not accrue dividends.

Liquidation—Upon liquidation, dissolution, or winding-up of the Company, Series A and Series B preferred stockholders do not receive a liquidation preference in priority to holders of common stock. Assets available for distribution will be allocated ratably among the preferred, on a fully converted basis, and the common stockholders based on their pro rata holdings.

Redemption—The Series A and Series B preferred stock can only be redeemed at the option of the holder for cash or other assets upon the occurrence of specific events following a “Deemed Liquidation Event” (as defined in the Company’s amended and restated certificate of incorporation) involving the sale, transfer, lease or other disposition of all or substantially all of the Company’s assets.

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A Deemed Liquidation Event that would give rise to a preferred stockholder's right of redemption cannot be triggered without approval of the Company's board of directors, because under applicable legal and contractual requirements, the Company's board of directors is required to approve (a) any closing of the sale, transfer, lease or other disposition, of all or substantially all of the Company's assets, (b) any consummation of the merger or consolidation of the Company with or into another entity and (c) the Company's participation in any closing of the transfer (whether by merger, consolidation, or otherwise), in which the Company is a constituent party to a person or group of affiliated persons, of the Company's securities, in which, after such closing, such person or group of affiliated persons would hold a majority of the outstanding voting stock of the Company (or the surviving or acquiring entity).

The holders of the Series A and Series B preferred stock do not have the ability to control whether the Company will redeem the preferred stock or cause the preferred stock to become redeemable (including through a Deemed Liquidation Event) through representation on the Company's board of directors, voting rights or other rights, and there is no event not solely within the Company's control that contractually could cause the holders of the Series A and Series B preferred stock to obtain such control.

Common stock

In March 2017, the Company's board of directors authorized the repurchase of up to 9,090,909 shares of its common stock at a price of $0.55 per share in a solicited offer to non-employees. The Company accounts for its common stock repurchases as treasury stock under the cost method. In April 2017, the Company repurchased 1,730,105 shares of common stock at a cost of $1.0 million pursuant to this repurchase program.

Voting, dividend and liquidation rights of the holders of the common stock are subject to and qualified by the rights, powers and preferences of the holders of the preferred stock.

The rights and privileges of the holders of common stock include the following:

Voting—Each holder of outstanding shares of common stock shall be entitled to one vote in respect of each share. The number of authorized shares of common stock may be increased or decreased by the affirmative vote of a majority of the outstanding shares of common stock and preferred stock voting together as a single class.

Dividends—Subject to preferred stockholders' right to receive at least an equal amount of dividends payable to the other classes of stock in the event of a dividend, the holders of common stock shall be entitled to receive dividends out of funds legally available at such times and in such amounts as the Company's board of directors may determine in its sole discretion.

Liquidation—Upon liquidation, dissolution, or winding-up of the Company, the common stockholders are entitled to receive assets available for distribution ratably with the preferred stockholders, on a fully converted basis, based on their pro rata holdings.

Redemption—The common stock is not redeemable at the option of the holder.

Note 7: Stock options

Under the terms of its stock option plans, the Company's board of directors may grant stock options to employees, directors and service providers. The Company issued stock options under the 2006 Stock Incentive Plan ("2006 plan") until April 2015, when the 2015 Stock Incentive Plan ("2015 plan") was adopted. The 2006

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plan expired in 2016; there are no remaining shares available to be granted under the 2006 plan and there were 3,671,488 and 3,327,044 stock options outstanding under the 2006 Plan as of December 31, 2016 and 2017, respectively.

Upon adoption of the 2015 plan, there were 11,250,000 shares of common stock reserved for issuance. There were 6,291,555 and 2,910,250 shares of common stock available for future grants under the 2015 plan as of December 31, 2016 and 2017, respectively, and 4,979,000 and 8,234,625 stock options outstanding as of December 31, 2016 and 2017, respectively. In May 2018, the Company amended the 2015 plan to increase the number of shares of common stock reserved for issuance to 17,530,000. The Company's board of directors determines the terms of stock options granted under the 2015 plan, including option exercise prices and vesting.

The Company recorded $0.2 million and an amount less than $0.1 million in employee and nonemployee share-based compensation expense, respectively, during the year ended December 31, 2016 and $0.4 million and an amount less than $0.1 million in employee and nonemployee share-based compensation expense, respectively, during the year ended December 31, 2017.

Share-based compensation expense related to stock options is included in the following line items in the consolidated statements of operations for the year ended December 31 (in thousands):

	2016	2017
Research and development	$118	$286
General and administrative	42	133
	$160	$419

Determining the appropriate fair value model and the related assumptions requires judgment. The fair value of each option grant is estimated using a Black-Scholes option-pricing model on the date of grant as follows:

	2016		2017	
	Nonemployees	Employees	Nonemployees	Employees
Estimated dividend yield	0.00%	0.00%	0.00%	0.00%
Weighted-average expected stock price volatility	75.00%	72.64%	70.28%	73.35%
Weighted-average risk-free interest rate	1.35%	1.51%	1.75%	1.99%
Expected life of options (in years)	6.11	6.11	4.60	6.10
Weighted-average fair value per option	$ 0.37	$ 0.32	$ 0.31	$ 0.36

The expected volatility rates are estimated based on the actual volatility of comparable public companies over the expected term. The expected life represents the average time that stock options that vest are expected to be outstanding.

The Company does not have sufficient history of exercising stock options to estimate the expected term of employee stock options and thus continues to calculate expected life based on the midpoint between the vesting date and the contractual term which is in accordance with the simplified method. The expected term for share-based compensation granted to nonemployees is the contractual life. The risk-free rate is based on the United States Treasury yield curve during the expected life of the option.

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The following table summarizes activity in the Company's stock option plans during the years ended December 31, 2016 and 2017:

	Outstanding option shares	Weighted-average exercise price
Balance as of January 1, 2016	8,093,954	$ 0.09
Granted	1,355,000	0.50
Exercised	(705,411)	0.01
Forfeited/canceled	(93,055)	0.19
Balance as of December 31, 2016	8,650,488	0.16
Granted	3,766,000	0.55
Exercised	(82,625)	0.19
Forfeited/canceled	(772,194)	0.29
Balance as of December 31, 2017	11,561,669	$ 0.29

The following table summarizes certain information about stock options granted under the stock option plans which are vested or expected to vest as of December 31, 2016 and 2017, by incorporating an estimated forfeiture rate:

		Number of options	Weighted-average remaining contractual life (in years)	Weighted-average exercise price
2016	Expected to be exercisable	8,460,390	6.70	$ 0.16
2016	Currently exercisable	4,788,524	4.98	0.05
2017	Expected to be exercisable	11,266,180	6.96	$ 0.28
2017	Currently exercisable	5,566,256	5.06	0.11

The following table summarizes certain information about stock options outstanding under the stock option plans as of December 31:

	2016		
Exercise price	Number of options outstanding	Weighted-average remaining life	Number of options exercisable
$0.0006 — $0.0058	898,714	2.33	898,714
$0.0145	2,772,774	4.38	2,772,774
$0.1900	3,849,000	8.65	1,117,036
$0.5600	1,130,000	9.62	—
	8,650,488		4,788,524

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	2017		
Exercise price	Number of options outstanding	Weighted-average remaining life	Number of options exercisable
$0.0006 — $0.0058	554,270	2.38	554,270
$0.0145	2,772,774	3.38	2,772,774
$0.1900	3,453,125	7.65	1,896,711
$0.5600	4,781,500	9.19	342,501
	11,561,669		5,566,256

There was approximately $0.7 million and $1.5 million of total unrecognized compensation cost related to unvested stock options as of December 31, 2016, and 2017, respectively, which is expected to be recognized over a weighted-average period of 3.19 and 3.03 years, respectively.

Note 8: Retirement plan

In January 2011, the Company established a defined contribution 401(k) retirement savings plan (the “Retirement Plan”) to all full-time employees. Employee contributions to the Retirement Plan can be 100% of annual compensation up to the prescribed annual maximum under the Internal Revenue Code. Administrative fees of less than $0.1 million were paid by the Company for the years ended December 31, 2016 and 2017.

The Retirement Plan includes a discretionary matching employer contribution equal to 100% of participants’ deferral contributions up to a certain percentage amount to be determined by the Company on an annual basis. The Company made contributions of $0.1 million and $0.2 million to the Retirement Plan during the years ended December 31, 2016 and 2017, respectively.

Note 9: Commitments and contingencies

Litigation

The Company is subject to various legal matters and claims in the ordinary course of business. Although the results of legal proceedings and claims cannot be predicted with certainty, in the opinion of management, there are currently no such known matters that will have a material effect on the consolidated financial condition, results of operations or cash flows of the Company.

Leases

In 2010, the Company entered into an agreement to lease office and laboratory space in Durham, North Carolina under a lease that is classified as an operating lease. The lease was amended in July 2015 to extend the term through July 31, 2021 and expanded to provide for additional space. As part of the amended lease, the landlord completed leasehold improvements on the new space. The new lease terms did not commence until the work was completed on January 1, 2016. The lease was amended again in 2016 to expand into additional space and extend the lease term until July 31, 2024.

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The following is a schedule of future minimum lease payments for all leases as of December 31, 2017 (in thousands):

	Operating leases
2018	$ 804
2019	1,033
2020	921
2021	953
2022	988
2023 and beyond	1,611

Future minimum lease payments due under certain operating lease arrangements contain fixed rent increases and rent abatements over the term of the lease. Rent expense on these operating leases is recognized over the term of the lease on a straight-line basis. The excess of rent expense over lease payments made has been reported in deferred rent and deferred rent-noncurrent in the consolidated balance sheets. Rent expense was $0.5 million and $0.8 million during the years ended December 31, 2016 and 2017, respectively, and apportioned between the “Research and development” and “General and administrative” lines items in the consolidated statements of operations.

Supply agreements

The Company enters into contracts in the ordinary course of business with CMOs for the manufacture of clinical trial materials. These agreements provide for termination at the request of either party with less than one-year notice and are, therefore, cancelable contracts and, if canceled, are not anticipated to have a material effect on the consolidated financial condition, results of operations or cash flows of the Company.

Note 10: Net loss per share and unaudited pro forma net loss per share

Net loss per share

Basic and diluted net loss per share attributable to common stockholders was calculated as follows (in thousands, except share and per share amounts):

	Years ended December 31,	
	2016	2017
Numerator:		
Net loss attributable to common stockholders	$ (8,251)	$ (21,102)
Denominator:		
Weighted-average shares of common stock outstanding—basic and diluted	34,825,334	33,956,010
Net loss per share attributable to common stockholders—basic and diluted	$ (0.24)	$ (0.62)

The Company’s potential dilutive securities have been excluded from the computation of diluted net loss per share as the effect would be to reduce the net loss per share. Therefore, the weighted-average number of shares of common stock outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same.

Precision BioSciences, Inc.
Notes to consolidated financial statements

The Company excluded the following potential common shares from the computation of diluted net loss per share attributable to common stockholders because including them would have had an anti-dilutive effect:

	Years ended December 31,	
	2016	2017
Preferred stock (as converted to common stock)	25,650,000	25,650,000
Outstanding stock options converted to common stock	5,699,346	5,891,176
Total	31,349,346	31,541,176

Unaudited pro forma net loss per share

The unaudited pro forma basic and diluted net loss per share attributable to common stockholders for the year ended December 31, 2017 has been prepared to give effect to adjustments arising upon the completion of a Qualified IPO. The unaudited pro forma net loss attributable to common stockholders used in the calculation of unaudited pro forma basic and diluted net loss per share attributable to common stockholders gives effect to the automatic conversion of all outstanding shares of convertible preferred stock into shares of common stock as if the proposed initial public offering had occurred on the later of January 1, 2017 or the issuance date of the convertible preferred stock.

The unaudited pro forma basic and diluted weighted-average shares of common stock outstanding used in the calculation of unaudited pro forma basic and diluted net loss per share attributable to common stockholders for the year ended December 31, 2017 has been prepared to give effect, upon a Qualified IPO, to the automatic conversion of all outstanding shares of convertible preferred stock into common stock as if the proposed initial public offering had occurred on the later of January 1, 2017 or the issuance date of the convertible preferred stock. Unaudited pro forma basic and diluted net loss per share attributable to common stockholders was calculated as follows (in thousands, except share and per share amounts):

	Year ended December 31, 2017
Numerator:	
Net loss attributable to common stockholders	$ (21,102)
Denominator:	
Weighted-average shares of common stock outstanding—basic and diluted	33,956,010
Pro forma adjustment to reflect automatic conversion of convertible preferred stock to common stock upon the completion of the proposed initial public offering (unaudited)	
Pro forma weighted-average shares of common stock outstanding—basic and diluted (unaudited)	
Pro forma net loss per share attributable to common stockholders—basic and diluted (unaudited)	

Precision BioSciences, Inc.
Notes to consolidated financial statements

Note 11: Income taxes

The Company recorded a less than $0.1 million current period state tax benefit for the year ended December 31, 2016 and no income tax expense due to the operating losses incurred for the years ended December 31, 2016 and 2017.

Significant components of the Company's deferred tax assets and deferred tax liabilities are as follows as of December 31 (in thousands):

	2016	2017
Noncurrent deferred tax assets:		
Net operating loss carryforwards	$ 6,681	$ 4,498
Contribution carryforwards	16	10
Deferred rent	164	272
Deferred revenue	110	4,429
Other assets	89	102
Tax credits	536	1,697
Less valuation allowance	(6,888)	(10,464)
Total deferred tax assets, noncurrent	708	544
Noncurrent deferred tax liability:		
Property and equipment	708	544
Total deferred tax liabilities, noncurrent	708	544
Net deferred tax assets	$ —	$ —

As of December 31, 2016 and 2017, the Company has provided a valuation allowance for the full amount of the net deferred tax assets as the realization of the net deferred tax assets is not determined to be more likely than not. The net increase in the valuation allowance for the year ended December 31, 2017 of $3.6 million is comprised of an increase in the valuation allowance recorded against the deferred tax assets, primarily deferred revenue for the year.

Precision BioSciences, Inc.
Notes to consolidated financial statements

The reasons for the difference between actual income tax benefit for the years ended December 31, 2016 and 2017 and the amount computed by applying the statutory federal income tax rate to losses before income tax benefit are as follows (dollars in thousands):

	2016		2017	
	Amount	% of pretax earnings	Amount	% of pretax earnings
Income tax expense at statutory rate	$ (2,805)	34.0%	$ (7,174)	34.0%
State income taxes, net of federal tax benefit	(163)	2.0%	(417)	2.0%
Non-deductible expenses	78	(1.0%)	208	(1.0%)
Credits	(283)	3.5%	(1,039)	4.9%
Change in federal tax rate	—	—	4,955	(23.5%)
Change in state tax rate	68	(0.8%)	2	—
Other	(12)	0.1%	(110)	0.5%
Change in valuation allowance	3,112	(37.7%)	3,575	(16.9%)
Income tax (benefit) expense	$ (5)	(0.1%)	$ —	0.0%

At December 31, 2016, the Company had federal and state net operating loss (“NOL”) carryforwards of approximately $19.1 million and $18.3 million, respectively. As of December 31, 2017, the Company had federal and state NOL carryforwards of approximately $20.1 million and $19.4 million, respectively. The federal NOL carryforwards begin to expire in 2030 and the state NOL carryforwards begin to expire in 2025. At December 31, 2016, the Company had federal and state research and development (“R&D”) tax credits of $0.5 million and an amount less than $0.1 million which begin to expire in 2027 and 2030, respectively. At December 31, 2017, the Company had federal and state R&D tax credits of $1.7 million and an amount less than $0.1 million, which begin to expire in 2027 and 2030, respectively. At December 31, 2016 and 2017, the Company had federal contribution carryforwards of amounts less than $0.1 million, which begin to expire in 2020.

The Company’s ability to utilize its NOL and R&D credit carryforwards may be substantially limited due to ownership changes that may have occurred or that could occur in the future, as required by Section 382 of the Internal Revenue Code of 1986, as amended (the Code), as well as similar state provisions. These ownership changes may limit the amount of NOL and R&D credit carryforwards that can be utilized annually to offset future taxable income and tax, respectively. In general, an “ownership change,” as defined by Section 382 of the Code, results from a transaction or series of transactions over a three-year period resulting in an ownership change of more than 50 percent of the outstanding stock of a company by certain stockholders or public groups. The Company has not completed a study to assess whether one or more ownership changes have occurred since the Company became a loss corporation under the definition of Section 382. If the Company has experienced an ownership change, utilization of the NOL or R&D credit carryforwards would be subject to an annual limitation, which is determined by first multiplying the value of the Company’s stock at the time of the ownership change by the applicable long-term, tax-exempt rate, and then could be subject to additional adjustments, as required. Any such limitation may result in the expiration of a portion of the NOL or R&D credit carryforwards before utilization. Until a study is completed and any limitation known, no amounts are being considered as an uncertain tax position or disclosed as an unrecognized tax benefit. Any carryforwards that expire prior to utilization as a result of such limitations will be removed from deferred tax assets with a corresponding reduction of the valuation allowance. Due to the existence of the valuation allowance, it is not expected that any possible limitation will have an impact on the results of operations of the Company.

Precision BioSciences, Inc.
Notes to consolidated financial statements

The Company reflects in the accompanying consolidated financial statements the benefit of positions taken in a previously filed tax return or expected to be taken in a future tax return only if it is considered 'more-likely-than-not' that the position taken will be sustained by the appropriate taxing authority. As of December 31, 2017 and 2016, the Company had no unrecognized income tax benefits. The Company's policy for recording interest and penalties relating to uncertain income tax positions is to record them as a component of income tax expense in the accompanying consolidated statements of operations. As of December 31, 2016 and 2017, the Company had no such accruals.

On December 22, 2017, the Tax Cuts and Jobs Act was enacted into law, which reduced the federal corporate income tax rate to 21% for tax years beginning after December 31, 2017. As a result of the newly enacted tax rate, the Company adjusted its deferred tax assets as of December 31, 2017 by applying the new 21% rate, which resulted in a decrease to the deferred tax assets and a corresponding decrease to the valuation allowance of approximately $5 million.

The SEC staff issued Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cuts and Jobs Act ("SAB 118"), which allows the Company to record provisional amounts during a measurement period which is similar to the measurement period used when accounting for business combinations. Provisional amounts have been recorded related to the deferred rate change. The Company will continue to assess the impact of the recently enacted tax law on its business and consolidated financial statements.

Note 12: Fair value measurements

The carrying amounts of the Company's financial instruments, including accounts receivable, accounts payable, and accrued expenses and other current liabilities, approximate their respective fair values due to their short-term nature. The Company uses a three-tier fair value hierarchy to classify and disclose all assets and liabilities measured at fair value on a recurring basis and to minimize the use of unobservable inputs when determining their fair value. The three tiers are defined as follows:

Level 1—Observable inputs based on unadjusted quoted prices in active markets for identical assets or liabilities

Level 2—Inputs, other than quoted prices in active markets, that are observable either directly or indirectly

Level 3—Unobservable inputs for which there is little or no market date, which require the Company to develop its own assumptions

The Company classifies investments in money market funds within Level 1 as the prices are available from quoted prices in active markets. Investments in repurchase agreements are classified within Level 2 as these instruments are valued using observable market inputs including reported trades, broker/dealer quotes, bids and/or offers.

As of December 31, 2016 and 2017, the Company held cash equivalents which is composed of money market funds and repurchase agreements that were purchased through repurchase intermediary banks and collateralized by deposits in the form of government securities and obligations.

Precision BioSciences, Inc.
Notes to consolidated financial statements

The following represents assets measured at fair value on a recurring basis by the Company (in thousands):

December 31, 2016	Fair value	Level 1	Level 2	Level 3
Assets:				
Money market funds	$ 36	$ 36	$ —	$ —
Repurchase agreements	90,800	—	90,800	—
	$ 90,836	$ 36	$90,800	$ —

December 31, 2017	Fair value	Level 1	Level 2	Level 3
Assets:				
Money market funds	$ 251	$ 251	$ —	$ —
Repurchase agreements	58,345	—	58,345	—
	$ 58,596	$ 251	$58,345	$ —

Note 13: Collaboration and license agreements

On February 16, 2015, the Company entered into a commercial license agreement, as subsequently amended, with Cargill Inc. (“Cargill”) that is focused on targeting and modifying certain genes related to saturated oil production in canola plants for an initial license fee, certain research funding and the right to receive royalties based on future sales (the “Cargill Agreement”). Under the terms of the Cargill Agreement, the Company granted Cargill an exclusive research license under certain nucleases and technology, for 24 months, which term was subsequently extended through November 2018, and a non-exclusive license under certain know-how for the length of the term for which the Company is eligible to receive royalties. Cargill may maintain certain exclusive rights by paying a one-time option fee. The Company recognized $1.6 million and $0.4 million in revenue during 2016 and 2017, respectively, under the Cargill Agreement.

On February 24, 2016, the Company entered into a development and commercial license agreement, as subsequently amended, with Servier that establishes a collaboration between the Company and Servier to develop allogeneic chimeric antigen receptor T cell therapies for up to six unique antigen targets selected by Servier. The Company granted Servier a development license and will perform early-stage R&D on the selected targets and develop the resulting therapeutic products through Phase 1 clinical trials and prepare clinical supply for use in Phase 2 clinical trials.

The Company received an upfront payment of $105.0 million under the Servier Agreement. At Phase 2 readiness for any product candidate covered by the Servier Agreement, Servier may exercise a commercial option to proceed with development and commercialization of the product candidate, subject to option fees. The Company has the ability to receive total payments, including the upfront payment, option fees and milestone payments, in the aggregate across all six targets that may be selected by Servier, of up to approximately $1.6 billion, as well as the payment of tiered royalties ranging from the mid-single digit percentages to the low double digit percentages on worldwide net sales of any products developed under the Servier Agreement, subject to customary potential reductions. The Company also has the right to participate in the development and commercialization of any licensed products resulting from the collaboration through a 50/50 codevelopment and copromotion option in the United States, subject to the payment of an option fee, which is exercisable after Servier’s commercial option exercise.

Precision BioSciences, Inc.
Notes to consolidated financial statements

The Company has determined that the targets are not separable and consist of one technology platform. As a result, the up-front payment for the development license and certain development milestones related to early-stage activities that are nonsubstantive, less fees to exercise the codevelopment and copromotion, were bundled into a single unit of accounting and are recognized as revenue over the estimated performance period of 9.5 years, which includes the period of time Servier has to nominate targets for development and the estimated time for the Company to complete early-stage product development activities. The Company recognized $4.8 million and $5.8 million in revenues during 2016 and 2017, respectively. The amount recorded as deferred revenue was $100.2 and $94.4 million as of December 31, 2016 and 2017, respectively. No development or sales-based milestones were received for the fiscal years ended December 31, 2016 and 2017.

Note 14: Segment reporting

The Company has developed a genome editing platform and performs related research for human therapeutic and agricultural applications. The Company's Chief Operating Decision Maker ("CODM") evaluates the Company's financial performance based on two reportable segments: Therapeutics and Plant Sciences. The Therapeutics segment is focused on the development of products in the field of immuno-oncology and of novel products outside immuno-oncology to treat human diseases. The Plant Sciences segment is focused on applying ARCUS to develop food and nutrition products through collaboration agreements with consumer-facing companies. The CODM reviews segment performance and allocates resources based upon segment revenue and segment operating loss of the Therapeutics and Plant Sciences reportable segments.

Segment operating loss is derived by deducting operational cash expenditures, net, from GAAP revenue. Operational cash expenditures are cash disbursements made that are directly attributable to the reportable segment (including directly attributable research and development and property, equipment, and software expenditures) plus an allocation of centralized research and development expenditures for early stage research, nuclease development and the purchase of general laboratory supplies. These expenditures are allocated to the segments based on headcount. The reportable segment and centralized research and development operational cash expenditures include cash disbursements for compensation, lab supplies, purchases of property, equipment, and software and procuring services from CROs, CMOs, and research organizations.

Certain cost items are not allocated to the Company's reportable segments. These cost items primarily consist of compensation and general operational expenses associated with the Company's executive, business development, finance, operations, human resources and legal functions. The Company does not allocate non-cash income statement amounts to its reportable segments, such as share based compensation, depreciation and amortization, intangible asset impairment charges and losses on disposal of assets.

Precision BioSciences, Inc.
Notes to consolidated financial statements

All segment revenue is earned in the United States and there are no intersegment revenues. Additionally, the Company reports assets on a consolidated basis and does not allocate assets to its reportable segments for purposes of assessing segment performance or allocating resources. Presented below is the financial information with respect to the Company's reportable segments (in thousands):

	Years ended December 31,	
	2016	**2017**
Revenue:		
Therapeutics	$ 5,375	6,064
Plant Sciences	1,640	420
Total segment revenue	7,015	6,484
Segment operational cash expenditures:		
Therapeutics	$ 5,763	11,062
Plant Sciences	831	1,699
Total segment operational cash expenditures	6,594	12,761
Allocation of centralized research and development operational cash expenditures:		
Therapeutics	$ 2,952	6,948
Plant Sciences	774	1,164
Total allocation of centralized research and development operational cash expenditures	3,726	8,112
Segment operating loss:		
Therapeutics	$ (3,340)	(11,946)
Plant Sciences	35	(2,443)
Total segment operating loss	(3,305)	(14,389)
Adjustments to reconcile segment operating loss to consolidated loss from operations:		
Corporate general and administrative cash expenditures	(5,753)	(9,117)
Interest income received	(570)	(872)
Impairment of intangible assets	—	(118)
Depreciation and amortization	(640)	(1,435)
Share-based compensation	(160)	(419)
Loss on disposal of assets	(9)	(56)
Adjustments to reconcile cash expenditures to GAAP expenses	1,609	4,432
Total consolidated loss from operations	$ (8,828)	(21,974)

Note 15: Subsequent events

On January 1, 2018, the Company entered into a research, collaboration and license agreement with the University of Pennsylvania ("Penn") that includes three gene knockout programs and up to three gene knockin or gene repair programs. The Company will provide funding to Penn and receive a license to certain technology invented under the agreement. The research funding payments will be expensed as incurred.

On January 24, 2018, the Company amended its Durham, North Carolina lease to provide for additional space in two different areas of the building. The first area is for 7,106 square feet and was occupied by the Company in

Precision BioSciences, Inc.
Notes to consolidated financial statements

May of 2018 and will be leased through July 31, 2024. The Company will pay $1.1 million over the lease term, which includes a rent abatement. The landlord also provided a $0.2 million allowance for improvements. The second area is for 2,848 square feet and was occupied by the Company in September 2018 and will be leased through July 31, 2024. The Company will pay $0.3 million over the lease term, which includes a rent abatement. The landlord also provided a $0.1 million allowance for improvements.

On August 6, 2018, the Company further amended its Durham, North Carolina lease to provide for additional space of 1,626 square feet, which was occupied by the Company in September of 2018 and will be leased through July 31, 2024. The Company will pay $0.3 million over the lease term. The landlord also provided an allowance of an amount less than $0.1 million for improvements.

On March 29, 2018, the Company entered into a long-term lease agreement for approximately 15,558 square feet of laboratory and office space in Research Triangle Park, North Carolina. The lease term is seven years and begins six months after the landlord delivers the premises to the Company, which was May 15, 2018. Total lease payments at lease inception were $3.2 million over the lease term. The Company has the option to accept an improvement allowance from the landlord, which ranges up to a maximum of $70.00 per square foot for improvements done on the premises. In September of 2018, the Company opted to accept the maximum level of improvement allowance offered by the landlord, which resulted in an incremental increase in rent. This increased the total lease payments due over the lease term to $3.6 million. The Company also has the ability to expand into other areas of the facility.

From May 2018 to July 2018, the Company issued 21,956,100 shares of the Series B preferred stock and received approximately $110.0 million in gross proceeds, less $0.2 million in aggregate offering costs.

On September 10, 2018, the Company and Gilead Sciences, Inc. (“Gilead”) entered into a collaboration and license agreement (the “Gilead Agreement”) to develop genome editing tools to target viral DNA associated with Hepatitis B. Pursuant to the terms of the agreement, Gilead will receive an exclusive license to exploit the resulting synthetic nucleases and products that use them to treat Hepatitis B in humans, and the Company is entitled to receive up to approximately $40 million in research funding over an initial three year term and milestone payments of up to an aggregate of $445 million. The Company is also entitled to receive tiered royalties ranging from the high single digit percentages to the mid-teen percentages on world-wide net sales of the products developed through the collaboration, subject to customary potential reductions. Gilead is responsible for obtaining regulatory approvals and, upon termination of the collaboration, will assume sole responsibility for the development and commercialization of such gene editing therapies and products. Precision will provide technology transfer of its development know-how prior to Gilead assuming responsibility and manufacture clinical supplies for use by Gilead at a price based on Precision’s costs.

On October 2, 2018, the Company entered into a long-term lease agreement for approximately 17,296 square feet of laboratory space located in Research Triangle Park, North Carolina. The lease term is seven years and two months and lease payments begin nine months after execution of the lease. Total lease payments will be approximately $3.5 million over the lease term. The landlord will provide the Company a maximum allowance of $70.58 per square foot for improvements done on the premises, which will be subject to landlord adjustments as outlined in the lease.

The Company has evaluated subsequent events through October 18, 2018, the date these consolidated financial statements were issued and has determined that there were no events which have occurred that would require adjustment to or disclosure in these consolidated financial statements other than those disclosed above.

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shares

Common stock

Prospectus

J.P. Morgan **Goldman Sachs & Co. LLC** **Jefferies** **Barclays**

, 2019

Part II
Information not required in prospectus

Item 13. Other expenses of issuance and distribution.

The following table indicates the expenses to be incurred in connection with the offering described in this registration statement, other than underwriting discounts and commissions, all of which will be paid by us. All amounts are estimated except the Securities and Exchange Commission registration fee, the Financial Industry Regulatory Authority, Inc., or FINRA, filing fee and the Nasdaq listing fee.

	Amount
Securities and Exchange Commission registration fee	$ *
FINRA filing fee	*
Nasdaq listing fee	*
Legal fees and expenses	*
Accounting fees and expenses	*
Blue sky fees and expenses	*
Printing and engraving expenses	*
Transfer agent fees and expenses	*
Miscellaneous	*
Total expenses	$ *

* To be filed by amendment.

Item 14. Indemnification of directors and officers.

Section 102 of the General Corporation Law of the State of Delaware permits a corporation to eliminate the personal liability of directors of a corporation to the corporation or its stockholders for monetary damages for a breach of fiduciary duty as a director, except where the director breached his or her duty of loyalty, failed to act in good faith, engaged in intentional misconduct or knowingly violated a law, authorized the payment of a dividend or approved a stock repurchase in violation of the General Corporation Law of the State of Delaware or obtained an improper personal benefit. Our amended and restated certificate of incorporation will provide that none of our directors shall be personally liable to us or to our stockholders for monetary damages for any breach of fiduciary duty as a director, notwithstanding any provision of law imposing such liability, except to the extent that the General Corporation Law of the State of Delaware prohibits the elimination or limitation of liability of directors for breaches of fiduciary duty.

Section 145 of the General Corporation Law of the State of Delaware provides that a corporation has the power to indemnify a director, officer, employee or agent of the corporation, or a person serving at the request of the corporation for another corporation, partnership, joint venture, trust or other enterprise in related capacities, against expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by the person in connection with an action, suit or proceeding to which he or she was or is a party or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding by reason of such position, if such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the best interests of the corporation and, in any criminal action or proceeding, had no reasonable cause to believe his or her conduct was unlawful, except that, in the case of actions brought by or in the right of the corporation, no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that the Court of Chancery or other adjudicating court determines that, despite the adjudication of liability but in

view of all of the circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which the Court of Chancery or such other court shall deem proper.

Our amended and restated bylaws will provide that we will indemnify each person who was or is a party or threatened to be made a party to any threatened, pending or completed action, suit or proceeding (other than an action by or in the right of our company) by reason of the fact that he or she is or was, or has agreed to become, a director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise (all such persons being referred to as an "Indemnitee"), or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding and any appeal therefrom, if such Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, our best interests, and, with respect to any criminal action or proceeding, he or she had no reasonable cause to believe his or her conduct was unlawful. Our amended and restated certificate of incorporation and amended and restated bylaws will provide that we will indemnify any Indemnitee who was or is a party to an action or suit by or in the right of our company to procure a judgment in our favor by reason of the fact that the Indemnitee is or was, or has agreed to become, a director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise, or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees) and, to the extent permitted by law, amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding, and any appeal therefrom, if the Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, our best interests, except that no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to us, unless a court determines that, despite such adjudication but in view of all of the circumstances, he or she is entitled to indemnification of such expenses. Notwithstanding the foregoing, to the extent that any Indemnitee has been successful, on the merits or otherwise, he or she will be indemnified by us against all expenses (including attorneys' fees) actually and reasonably incurred in connection therewith. Expenses must be advanced to an Indemnitee under certain circumstances.

We have entered into indemnification agreements with each of our directors and executive officers. These indemnification agreements may require us, among other things, to indemnify our directors and executive officers for expenses, including attorneys' fees, judgments, fines and settlement amounts incurred by a director or executive officer in any action or proceeding arising out of his or her service as one of our directors or executive officers, or any of our subsidiaries or any other company or enterprise to which the person provides services at our request.

We maintain a general liability insurance policy that covers certain liabilities of directors and officers of our corporation arising out of claims based on acts or omissions in their capacities as directors or officers.

In any underwriting agreement we enter into in connection with the sale of common stock being registered hereby, the underwriters will agree to indemnify, under certain conditions, us, our directors, our officers and persons who control us within the meaning of the Securities Act of 1933, as amended, or the Securities Act, against certain liabilities.

Item 15. Recent sales of unregistered securities.

Set forth below is information regarding shares of capital stock issued by us within the past three years. Also included is the consideration received by us for such shares and information relating to the section of the

Securities Act, or rule of the Securities and Exchange Commission, under which exemption from registration was claimed.

(a) Issuances of Capital Stock.

In April 2015 and May 2015, we issued 25,650,000 shares of Series A Preferred Stock to certain accredited investors at a price of $1.00 per share for aggregate proceeds of approximately $26.65 million. From May 2018 to July 2018, we issued 21,956,095 shares of Series B Preferred Stock to certain accredited investors at a price of $5.01 per share for aggregate proceeds of approximately $110.0 million.

(b) Equity Grants and Issuances under Stock Incentive Plans.

Since September 2015, we have granted stock option and restricted stock awards to purchase an aggregate of 6,542,250 shares of our common stock to employees, consultants and directors under our 2015 Stock Incentive Plan with exercise or purchase prices ranging between $0.19 and $4.76 per share, and we have issued 478,713 shares of restricted common stock to employees, consultants and directors under our 2015 Stock Incentive Plan. In addition, since September 2015, we have also issued 1,766,243 shares of restricted common stock to employees, consultants and directors in connection with the exercise of stock options granted under our 2006 Stock Incentive Plan.

The issuances of the above securities were deemed to be exempt from registration under the Securities Act in reliance upon Section 4(a)(2) of the Securities Act or Regulation D promulgated thereunder, or Rule 701 promulgated under Section 3(b) of the Securities Act, as transactions by an issuer not involving any public offering or pursuant to benefit plans and contracts relating to compensation as provided under Rule 701. Individuals who purchased securities as described above represented their intention to acquire the securities for investment only and not with a view to or for sale in connection with any distribution thereof, and appropriate legends were affixed to the share certificates issued in such transactions.

None of the foregoing transactions involved any underwriters, underwriting discounts or commissions or any public offering.

Item 16. Exhibits and financial statement schedules.

(a) Exhibits.

Exhibit number	Description
1.1*	Form of Underwriting Agreement
3.1*	Amended and Restated Certificate of Incorporation of the Registrant, as currently in effect
3.2*	Form of Amended and Restated Certificate of Incorporation of the Registrant, to be effective upon the closing of this offering
3.3*	Amended and Restated By-laws of the Registrant, as currently in effect
3.4*	Form of Amended and Restated Bylaws of the Registrant, to be effective upon the closing of this offering
4.1*	Specimen Common Stock Certificate
4.2	Amended and Restated Investors' Rights Agreement among the Registrant and certain of its stockholders, dated May 25, 2018
5.1*	Opinion of Smith, Anderson, Blount, Dorsett, Mitchell & Jernigan, LLP
10.1*†	Development and Commercial License Agreement by and between Les Laboratoires Servier and the Registrant, dated February 24, 2016, as amended

Exhibit number	Description
10.2†	License Agreement by and between Duke University and the Registrant, dated April 17, 2006, as amended
10.3†	Patent Cross-License Agreement by and between Cellectis SA and the Registrant, dated January 23, 2014
10.4†	Collaboration and License Agreement by and between Gilead Sciences, Inc. and the Registrant, dated September 10, 2018
10.5*	Lease Agreement between the Registrant and Venable Center, LLC, dated April 5, 2010, as amended
10.6*	Lease Agreement between Elo Life Systems, Inc. and ARE-NC Region No. 17, LLC, dated March 29, 2018
10.7*	Lease Agreement between Registrant and Durham TW Alexander, LLC, dated October 2, 2018
10.8	2006 Stock Incentive Plan, as amended, and form of award agreements thereunder
10.9	2015 Stock Incentive Plan, as amended, and form of award agreements thereunder
10.10*	2019 Incentive Award Plan, and form of award agreements thereunder
10.11*	2019 Employee Stock Purchase Plan
10.12*	Employment Agreement between the Registrant and Matthew Kane, dated June 14, 2015
10.13*	Employment Agreement between the Registrant and Derek Jantz, dated July 23, 2015
10.14*	Employment Agreement between the Registrant and Fayaz Khazi, dated May 1, 2017
10.15*	Employment Agreement between the Registrant and David Thomson, dated July 3, 2017
10.16*	Form of Indemnification Agreement between the Registrant and its directors and officers
10.17*	Non-Employee Director Compensation Plan
21.1	Subsidiaries of the Registrant
23.1*	Consent of Deloitte & Touche LLP
23.2*	Consent of Smith, Anderson, Blount, Dorsett, Mitchell & Jernigan, LLP (included as part of Exhibit 5.1)
24.1*	Power of Attorney (included on signature page)

* To be filed by amendment.

† Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a request for confidential treatment pursuant to Rule 406 under the Securities Act of 1933, as amended, and have been filed separately with the Securities and Exchange Commission.

(b) Financial Statement Schedules. Schedules not listed above have been omitted because the information required to be set forth therein is not applicable or is shown in the consolidated financial statements or notes thereto.

Item 17. Undertakings.

The undersigned registrant hereby undertakes to provide to the underwriter, at the closing specified in the underwriting agreement, certificates in such denominations and registered in such names as required by the underwriter to permit prompt delivery to each purchaser.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

The undersigned hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this registration statement as of the time it was declared effective.

(2) For the purpose of determining any liability under the Securities Act, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

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Signatures

Pursuant to the requirements of the Securities Act of 1933, the registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Durham, State of North Carolina, on this day of , 2019.

PRECISION BIOSCIENCES, INC.
(Registrant)

By: _____
Matthew Kane
President and Chief Executive Officer

Power of attorney and signatures

We, the undersigned officers and directors of Precision BioSciences, Inc., hereby severally constitute and appoint Matthew Kane and Abid Ansari, and each of them singly (with full power to each of them to act alone), our true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution in each of them for him and in his name, place and stead, and in any and all capacities, to sign any and all amendments (including post-effective amendments) to this registration statement (or any other registration statement for the same offering that is to be effective upon filing pursuant to Rule 462(b) under the Securities Act of 1933), and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises, as full to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons in the capacities indicated.

Signature	Title	Date
_____ Matthew Kane	President, Chief Executive Officer and Director *(Principal Executive Officer)*	, 2019
_____ Abid Ansari	Vice President, Finance and Operations *(Principal Financial and Accounting Officer)*	, 2019
_____ Robert Adelman, M.D.	Director	, 2019
_____ Derek Jantz, Ph.D.	Director	, 2019
_____ Tony Yao, M.D., Ph.D.	Director	, 2019

PRECISION BIOSCIENCES, INC.
AMENDED AND RESTATED INVESTORS' RIGHTS AGREEMENT

This AMENDED AND RESTATED INVESTORS' RIGHTS AGREEMENT (the "Agreement") is made as of the 25th day of May, 2018, by and among Precision BioSciences, Inc., a Delaware corporation (the "Company"), the investors listed on Schedule A hereto, each of which is herein referred to as an "Investor" and collectively as the "Investors", and the holders of Common Stock (as defined below) listed on Schedule B hereto, each of which is herein referred to as a "Common Holder" and collectively as the "Common Holders".

RECITALS

WHEREAS, certain of the Investors (the "Existing Investors") and the Common Holders hold shares of the Series A Stock (as defined below) and/or shares of Common Stock issued upon conversion thereof and variously possess registration rights, information rights, right of first offer, and other rights pursuant to an Investors' Rights Agreement dated as of April 29, 2015 between the Company and such Investors and the Common Holders, as amended by the Omnibus Amendment to Investors Rights Agreement, Voting Agreement and ROFR and Co-Sale Agreement dated as of December 21, 2016 (as amended, the "Prior Agreement"); and

WHEREAS, the Existing Investors are holders of at least 58% of the Registrable Securities (as defined in the Prior Agreement) of the Company and desire to amend and restate the Prior Agreement in its entirety and to accept the rights created pursuant to this Agreement in lieu of the rights granted to them under the Prior Agreement; and

WHEREAS, certain of the Investors are parties to that certain Series B Preferred Stock Purchase Agreement of even date herewith between the Company and such Investors (the "Purchase Agreement"), under which the Company's and such Investors' obligations are conditioned upon the execution and delivery of this Agreement by such Investors, Existing Investors holding at least 58% of the Registrable Securities, the Common Holders and the Company;

NOW, THEREFORE, the Company, the Existing Investors and the Common Holders hereby agree that the Prior Agreement shall be amended and restated in its entirety by this Agreement, and the parties to this Agreement further agree as follows:

1. Definitions. For purposes of this Agreement:

(a) "1934 Act" means the Securities Exchange Act of 1934, as amended.

(b) "Act" means the Securities Act of 1933, as amended.

(c) "Affiliate" means, with respect to any Person, any other Person who or which, directly or indirectly, controls, is controlled by, or is under common control with such specified Person, including, without limitation, any general partner, limited partner, member, managing member, employee, officer, director or manager of such Person, or with

respect to F-Prime (as defined below) or any Affiliate of F-Prime only, any trust for the benefit of any of the foregoing or trust for the benefit of any Affiliate of the foregoing, or any venture capital, hedge or private equity style fund now or hereafter existing that is controlled by one or more general partners or managing members of, or is under common investment management with, such Person. For purposes of this definition, the term "control" when used with respect to any Person means the power to direct the management or policies of such Person, directly or indirectly, whether through ownership of voting securities, by contract or otherwise, and the terms "controlling" and "controlled" shall have meanings correlative to the foregoing.

(d) "Board" means the Company's Board of Directors, as constituted from time to time.

(e) "Common Holder Registrable Securities" means (i) the 22,330,742 shares of Common Stock or Common Stock issuable upon the exercise of options held by the Common Holders, and (ii) any Common Stock issued as (or issuable upon the conversion or exercise of any warrant, right, or other security that is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of such shares.

(f) "Common Stock" means the Company's Common Stock, par value $0.000005 per share.

(g) "Form S-3" means such form under the Act as in effect on the date hereof or any registration form under the Act subsequently adopted by the SEC that permits inclusion or incorporation of substantial information by reference to other documents filed by the Company with the SEC.

(h) "Free Writing Prospectus" means a free-writing prospectus, as defined in Rule 405.

(i) "Holder" means any Person owning or having the right to acquire Registrable Securities or any assignee thereof in accordance with Section 2.10 of this Agreement.

(j) "Initial Offering" means the Company's first firm commitment underwritten public offering of its Common Stock under the Act.

(k) "Key Employee" means the employees of the Company listed on Schedule B attached hereto.

(l) "Person" shall mean any individual, corporation, partnership, trust, limited liability company, association or other entity.

(m) "Preferred Directors" shall have the meaning given to it in the Restated Certificate.

(n) "Preferred Stock" shall mean the Series A Stock and the Series B Stock.

(o) "Register," "registered," and "registration" refer to a registration effected by preparing and filing a registration statement or similar document in compliance with the Act, and the declaration or ordering of effectiveness of such registration statement or document.

(p) "Registrable Securities" means (i) the Common Stock issuable or issued upon conversion of the Preferred Stock, and any Common Stock issued as (or issuable upon conversion or exercise of any warrant, right or other security which is issued as) a dividend or other distribution with respect to, in exchange for or in replacement of such Preferred Stock, and (ii) the Common Holder Registrable Securities, provided, however, that such Common Holder Registrable Securities shall not be deemed Registrable Securities and the Common Holders shall not be deemed Holders for the purposes of Sections 2.1, 2.11 and 4.6 and any Common Stock of the Company issued as (or issuable upon the conversion or exercise of any warrant, right or other security that is issued as) a dividend or other distribution with respect to, or in exchange for, or in replacement of, the shares referenced in (i) and (ii) above, excluding in all cases, however, any Registrable Securities sold by a Person in a transaction in which such Person's rights under Section 2 of this Agreement are not assigned. In addition, the number of shares of Registrable Securities outstanding shall equal the aggregate of the number of shares of Common Stock outstanding that are, and the number of shares of Common Stock issuable pursuant to then exercisable or convertible securities that are, Registrable Securities.

(q) "Required Holders" shall mean the written consent or affirmative vote of the holders of at least sixty percent (60%) of the Registrable Securities issued or issuable upon conversion of the Preferred Stock, given in writing or by vote at a meeting, consenting or voting (as the case may be) together as a single class on an as-converted basis.

(r) "Restated Certificate" shall mean the Company's Third Amended and Restated Certificate of Incorporation, as further amended and/or restated from time to time.

(s) "Rule 144" shall mean Rule 144 under the Act.

(t) "Rule 405" shall mean Rule 405 under the Act.

(u) "SEC" shall mean the Securities and Exchange Commission.

(v) "Series A Stock" means the Company's Series A Preferred Stock, par value $0.0001 per share.

(w) "Series B Stock" means the Company's Series B Preferred Stock, par value $0.0001 per share.

2. Registration Rights. The Company covenants and agrees as follows:

2.1 Request for Registration.

(a) Subject to the conditions of this Section 2.1, if the Company shall receive at any time after the earlier of (i) December 31, 2021 or (ii) six (6) months after the effective date of the Initial Offering, a written request from the Required Holders (for purposes

of this Section 2.1, the "Initiating Holders") that the Company file a registration statement under the Act covering the registration of Registrable Securities with an anticipated aggregate offering price of at least (A) $150,000,000 if such request is received after the date set forth in clause (i) above, but prior to the Initial Offering or (B) $15,000,000 if such request is received after the Initial Offering and the Company is not eligible to register the Registrable Securities on Form S-3, then the Company shall, within twenty (20) days of the receipt thereof, give written notice of such request to all Holders, and subject to the limitations of this Section 2.1, use its best efforts to effect, within ninety (90) days after the date of the request by the Initiating Holders, the registration under the Act of all Registrable Securities that the Holders request to be registered in a written request received by the Company within twenty (20) days of the mailing of the Company's notice pursuant to this Section 2.1(a).

(b) If the Initiating Holders intend to distribute the Registrable Securities covered by their request by means of an underwriting, they shall so advise the Company as a part of their request made pursuant to this Section 2.1, and the Company shall include such information in the written notice referred to in Section 2.1(a). In such event the right of any Holder to include its Registrable Securities in such registration shall be conditioned upon such Holder's participation in such underwriting and the inclusion of such Holder's Registrable Securities in the underwriting (unless otherwise mutually agreed by a majority in interest of the Initiating Holders and such Holder) to the extent provided herein. All Holders proposing to distribute their securities through such underwriting shall enter into an underwriting agreement in customary form with the underwriter or underwriters selected for such underwriting by the Company (which underwriter or underwriters shall be reasonably acceptable to those Initiating Holders holding a majority of the Registrable Securities then held by all Initiating Holders). Notwithstanding any other provision of this Section 2.1, if the underwriter advises the Company that marketing factors require a limitation on the number of securities underwritten (including Registrable Securities), then the Company shall so advise all Holders of Registrable Securities that would otherwise be underwritten pursuant hereto, and the number of shares that may be included in the underwriting shall be allocated to the Holders of such Registrable Securities pro rata based on the number of Registrable Securities held by all such Holders (including the Initiating Holders). In no event shall any Registrable Securities be excluded from such underwriting unless all other securities are first excluded. Any Registrable Securities excluded or withdrawn from such underwriting shall be withdrawn from the registration.

(c) Notwithstanding the foregoing, the Company shall not be required to effect a registration pursuant to this Section 2.1:

(i) in any particular jurisdiction in which the Company would be required to execute a general consent to service of process in effecting such registration, unless the Company is already subject to service in such jurisdiction and except as may be required under the Act; or

(ii) after the Company has effected three (3) registrations pursuant to this Section 2.1, and such registrations have been declared or ordered effective; or

(iii) during the period starting with the date sixty (60) days prior to the Company's good faith estimate of the date of the filing of, and ending on a date one

hundred eighty (180) days following the effective date of, a Company-initiated registration subject to Section 2.2 below, provided that the Company is actively employing in good faith its best efforts to cause such registration statement to become effective; or

(iv) if the Initiating Holders propose to dispose of Registrable Securities that may be registered on Form S-3 pursuant to Section 2.3 hereof; or

(v) if the Company shall furnish to Holders requesting a registration statement pursuant to this Section 2.1 a certificate signed by the Company's Chief Executive Officer stating that in the good faith judgment of the Board, it would be materially detrimental to the Company and its stockholders for such registration statement to either become effective or remain effective for as long as such registration statement otherwise would be required to remain effective, then the Company shall have the right to defer such filing for a period of not more than ninety (90) days after receipt of the request of the Initiating Holders; provided that such right shall be exercised by the Company not more than once in any twelve (12) month period.

2.2 Company Registration.

(a) If (but without any obligation to do so) the Company proposes to register (including for this purpose a registration effected by the Company for stockholders other than the Holders) any of its stock or other securities under the Act in connection with the public offering of such securities (other than (i) a registration relating to a request pursuant to Section 2.1 of this Agreement or (ii) a registration relating solely to the sale of securities of participants in a Company employee benefit or stock ownership plan, a registration relating to a corporate reorganization or transaction under Rule 145 of the Act, a registration on any form that does not include substantially the same information as would be required to be included in a registration statement covering the sale of the Registrable Securities, or a registration in which the only Common Stock being registered is Common Stock issuable upon conversion of debt securities that are also being registered), the Company shall, at such time, promptly give each Holder written notice of such registration. Upon the written request of each Holder given within twenty (20) days after mailing of such notice by the Company in accordance with Section 4.5 of this Agreement, the Company shall, subject to the provisions of Section 2.2(c) of this Agreement, use its best efforts to cause to be registered under the Act all of the Registrable Securities that each such Holder requests to be registered.

(b) Right to Terminate Registration. The Company shall have the right to terminate or withdraw any registration initiated by it under this Section 2.2 prior to the effectiveness of such registration whether or not any Holder has elected to include securities in such registration. The expenses of such withdrawn registration shall be borne by the Company in accordance with Section 2.6 hereof.

(c) Underwriting Requirements. In connection with any offering involving an underwriting of shares of the Company's capital stock, the Company shall not be required under this Section 2.2 to include any of the Holders' Registrable Securities in such underwriting unless they accept the terms of the underwriting as agreed upon between the Company and the underwriters selected by the Company (or by other Persons entitled to select

the underwriters) and enter into an underwriting agreement in customary form with such underwriters. If the total amount of securities, including Registrable Securities, requested by stockholders to be included in such offering exceeds the amount of securities to be sold (other than by the Company) that the underwriters determine in their sole discretion is compatible with the success of the offering, then the Company shall be required to include in the offering only that number of such securities, including Registrable Securities, that the underwriters determine in their sole discretion will not jeopardize the success of the offering. In the event that the underwriters determine that less than all of the Registrable Securities requested to be registered can be included in such offering, then the Registrable Securities that are included in such offering shall be apportioned pro rata among the selling Holders based on the number of Registrable Securities held by all selling Holders or in such other proportions as shall mutually be agreed to by all such selling Holders. Notwithstanding the foregoing, in no event shall (i) any Registrable Securities be excluded from such offering unless all other stockholders' securities have been first excluded from the offering, (ii) the amount of securities of the selling Holders included in the offering be reduced below twenty-five percent (25%) of the total amount of securities included in such offering, unless such offering is the Initial Offering, in which case the selling Holders may be excluded if the underwriters make the determination described above and no other stockholder's securities are included in such offering or (iii) notwithstanding (ii) above, any Registrable Securities which are not Common Holder Registrable Securities be excluded from such underwriting unless all Common Holder Registrable Securities are first excluded from such offering. For purposes of the preceding sentence concerning apportionment, for any selling stockholder that is a Holder of Registrable Securities and that is a venture capital, hedge or private equity style fund, partnership or corporation, the affiliated venture capital, hedge or private equity style funds, partners, members, retired partners and stockholders of such Holder, or the estates and family members of any such partners, members and retired partners and any trusts for the benefit of any of the foregoing Persons, or, with respect to F-Prime or an Affiliate of F-Prime only, any trust for the benefit of any of the foregoing or trust for the benefit of any Affiliate of the foregoing, shall be deemed to be a single "selling Holder," and any pro rata reduction with respect to such "selling Holder" shall be based upon the aggregate amount of Registrable Securities owned by all such related entities and individuals.

2.3 Form S-3 Registration. In case the Company shall receive, at any time after the first anniversary of the Initial Offering, from the Holders of at least twenty-five percent (25%) of the Registrable Securities (for purposes of this Section 2.3, the "S-3 Initiating Holders") a written request or requests that the Company effect a registration on Form S-3 and any related qualification or compliance with respect to all or a part of the Registrable Securities owned by such Holder or Holders, the Company shall:

(a) promptly give written notice of the proposed registration, and any related qualification or compliance, to all other Holders; and

(b) use its best efforts to effect, as soon as practicable, such registration and all such qualifications and compliances as may be so requested and as would permit or facilitate the sale and distribution of all or such portion of such Holders' Registrable Securities as are specified in such request, together with all or such portion of the Registrable Securities of any other Holders joining in such request as are specified in a written request given within fifteen (15) days after receipt of such written notice from the Company; provided,

however, that the Company shall not be obligated to effect any such registration, qualification or compliance, pursuant to this Section 2.3:

(i) if Form S-3 is not available for such offering by the Holders;

(ii) if the Holders, together with the holders of any other securities of the Company entitled to inclusion in such registration, propose to sell Registrable Securities and such other securities (if any) at an aggregate price to the public (net of any underwriters' discounts or commissions) of less than $1,000,000;

(iii) if the Company shall furnish to all Holders requesting a registration statement pursuant to this Section 2.3 a certificate signed by the Company's Chief Executive Officer stating that in the good faith judgment of the Board, it would be materially detrimental to the Company and its stockholders for such registration statement to either become effective or remain effective for as long as such registration statement otherwise would be required to remain effective, then the Company shall have the right to defer such filing for a period of not more than ninety (90) days after receipt of the request of the S-3 Initiating Holders; provided that such right shall be exercised by the Company not more than once in any twelve (12) month period;

(iv) if the Company has, within the twelve (12) month period preceding the date of such request, already effected at least two (2) registrations on Form S-3 pursuant to this Section 2.3 or if the Company has, within the four (4) month period preceding the date of such request, already effected at least one (1) registration on Form S-3 pursuant to this Section 2.3;

(v) in any particular jurisdiction in which the Company would be required to qualify to do business or to execute a general consent to service of process in effecting such registration, qualification or compliance;

(vi) if the Company, within thirty (30) days of receipt of the request of such S-3 Initiating Holders, gives notice of its bona fide intention to effect the filing of a registration statement with the SEC within one hundred twenty (120) days of receipt of such request (other than a registration effected solely to qualify an employee benefit plan or to effect a business combination pursuant to Rule 145), provided that the Company is actively employing in good faith its best efforts to cause such registration statement to become effective; or

(vii) during the period starting with the date thirty (30) days prior to the Company's good faith estimate of the date of the filing of and ending on a date ninety (90) days following the effective date of a Company-initiated registration subject to Section 2.2 of this Agreement, provided that the Company is actively employing in good faith its best efforts to cause such registration statement to become effective.

(c) If the S-3 Initiating Holders intend to distribute the Registrable Securities covered by their request by means of an underwriting, they shall so advise the Company as a part of their request made pursuant to this Section 2.3 and the Company shall include such information in the written notice referred to in Section 2.3(a). The provisions of

Section 2.1(b) of this Agreement shall be applicable to such request (with the substitution of Section 2.3 for references to Section 2.1).

(d) Subject to the foregoing, the Company shall file a registration statement covering the Registrable Securities and other securities so requested to be registered as soon as practicable after receipt of the request or requests of the S-3 Initiating Holders. Registrations effected pursuant to this Section 2.3 shall not be counted as requests for registration effected pursuant to Section 2.1 of this Agreement.

2.4 Obligations of the Company. Whenever required under this Section 2 to effect the registration of any Registrable Securities, the Company shall, as expeditiously as reasonably possible:

(a) prepare and file with the SEC a registration statement with respect to such Registrable Securities and use its best efforts to cause such registration statement to become effective, and, upon the request of the Holders of a majority of the Registrable Securities registered thereunder, keep such registration statement effective for a period of up to one hundred twenty (120) days or, if earlier, until the distribution contemplated in the Registration Statement has been completed;

(b) prepare and file with the SEC such amendments and supplements to such registration statement and the prospectus used in connection with such registration statement as may be necessary to comply with the provisions of the Act in order to enable the disposition of all securities covered by such registration statement;

(c) furnish to the selling Holders such number of copies of a prospectus, including a preliminary prospectus and any Free Writing Prospectus, in conformity with the requirements of the Act, and such other documents as they may reasonably request in order to facilitate the disposition of Registrable Securities owned by them;

(d) use its best efforts to register and qualify the securities covered by such registration statement under such other securities or Blue Sky laws of such jurisdictions as shall be reasonably requested by the Holders, provided that the Company shall not be required in connection therewith or as a condition thereto to qualify to do business or to file a general consent to service of process in any such states or jurisdictions, unless the Company is already subject to service in such jurisdiction and except as may be required by the Act;

(e) in the event of any underwritten public offering, enter into and perform its obligations under an underwriting agreement, in usual and customary form, with the managing underwriter of such offering;

(f) notify each Holder of Registrable Securities covered by such registration statement at any time when a prospectus or Free Writing Prospectus (to the extent prepared by or on behalf of the Company) relating thereto is required to be delivered under the Act of the happening of any event as a result of which the prospectus included in such registration statement, as then in effect, includes an untrue statement of a material fact or omits to state a material fact required to be stated therein or necessary to make the statements therein not misleading in the light of the circumstances then existing, and, at the request of any such

Holder, the Company will, as soon as reasonably practicable, file and furnish to all such Holders a supplement or amendment to such prospectus or Free Writing Prospectus (to the extent prepared by or on behalf of the Company) so that, as thereafter delivered to the purchasers of such Registrable Securities, such prospectus will not contain an untrue statement of a material fact or omit to state any fact necessary to make the statements therein not misleading in light of the circumstances under which they were made;

(g) cause all such Registrable Securities registered pursuant to this Section 2 to be listed on a national exchange or trading system and on each securities exchange and trading system on which similar securities issued by the Company are then listed; and

(h) provide a transfer agent and registrar for all Registrable Securities registered pursuant to this Agreement and a CUSIP number for all such Registrable Securities, in each case not later than the effective date of such registration.

Notwithstanding the provisions of this Section 2, the Company shall be entitled to postpone or suspend, for a reasonable period of time, the filing, effectiveness or use of, or trading under, any registration statement if the Company shall determine that any such filing or the sale of any securities pursuant to such registration statement would in the good faith judgment of the Board:

(i) impede, delay or interfere with any material pending or proposed financing, acquisition, corporate reorganization or other similar transaction involving the Company;

(ii) impair the consummation of any pending or proposed material offering or sale of any class of securities by the Company; or

(iii) require disclosure of material nonpublic information that, if disclosed at such time, would be harmful to the interests of the Company and its stockholders; provided, however, that during any such period all executive officers and directors of the Company are also prohibited from selling securities of the Company (or any security of any of the Company's subsidiaries or affiliates).

In the event of the suspension of effectiveness of any registration statement pursuant to this Section 2.4, the applicable time period during which such registration statement is to remain effective shall be extended by that number of days equal to the number of days the effectiveness of such registration statement was suspended.

2.5 Information from Holder. It shall be a condition precedent to the obligations of the Company to take any action pursuant to this Section 2 with respect to the Registrable Securities of any selling Holder that such Holder shall furnish to the Company such information regarding itself, the Registrable Securities held by it, and the intended method of disposition of such securities as shall be reasonably required to effect the registration of such Holder's Registrable Securities.

2.6 Expenses of Registration. All expenses (other than underwriting discounts and commissions) incurred in connection with registrations, filings or qualifications pursuant to

Sections 2.1, 2.2 and 2.3 of this Agreement, including, without limitation, all registration, filing and qualification fees, printers' and accounting fees, fees and disbursements of counsel for the Company and the reasonable fees and disbursements of one counsel for the selling Holders shall be borne by the Company. Notwithstanding the foregoing, the Company shall not be required to pay for any expenses of any registration proceeding begun pursuant to Section 2.1 or Section 2.3 of this Agreement if the registration request is subsequently withdrawn at the request of the Holders of a majority of the Registrable Securities to be registered (in which case all participating Holders shall bear such expenses pro rata based upon the number of Registrable Securities that were to be included in the withdrawn registration), unless in the case of a registration requested under Section 2.1 or Section 2.3, the Holders of a majority of the Registrable Securities to be registered agree to forfeit their right to one demand registration pursuant to Section 2.1 or Section 2.3, as the case may be; provided, however, that if at the time of such withdrawal, the Holders have learned material adverse information concerning the Company different from that known to the Holders at the time of their request and have withdrawn the request with reasonable promptness following disclosure by the Company of such material adverse information, then the Holders shall not be required to pay any of such expenses and shall retain their rights pursuant to Section 2.1 or Section 2.3 of this Agreement.

2.7 Delay of Registration. No Holder shall have any right to obtain or seek an injunction restraining or otherwise delaying any such registration pursuant to this Agreement as the result of any controversy that might arise with respect to the interpretation or implementation of this Section 2.

2.8 Indemnification. In the event any Registrable Securities are included in a registration statement under this Section 2:

(a) To the extent permitted by law, the Company will indemnify and hold harmless each Holder, severally and not jointly, the partners, members, officers, directors and stockholders of each Holder, legal counsel and accountants for each Holder, any underwriter (as defined in the Act) for such Holder and each Person, if any, who controls such Holder or underwriter within the meaning of the Act or the 1934 Act, against any losses, claims, damages or liabilities (joint or several) to which they may become subject under the Act, the 1934 Act, any state securities laws or any rule or regulation promulgated under the Act, the 1934 Act or any state securities laws, insofar as such losses, claims, damages, or liabilities (or actions or proceedings, whether commenced or threatened, in respect thereof) arise out of or are based upon any of the following statements, omissions or violations (collectively, a "Violation"): (i) any untrue or alleged untrue statement of a material fact contained in such registration statement, including any preliminary prospectus, final prospectus, or Free Writing Prospectus contained therein or any amendments or supplements thereto, any issuer information (as defined in Rule 433 of the Act) filed or required to be filed pursuant to Rule 433(d) under the Act or any other document incident to such registration prepared by or on behalf of the Company or used or referred to by the Company, (ii) the omission or alleged omission of a material fact required to be stated in such registration statement, or necessary to make the statements therein not misleading or (iii) any violation or alleged violation by the Company of the Act, the 1934 Act, any state securities laws or any rule or regulation promulgated under the Act, the 1934 Act or any state securities laws, and the Company will reimburse each such Holder, underwriter, controlling Person or other aforementioned Person for any legal or other expenses reasonably

incurred by them in connection with investigating or defending any such loss, claim, damage, liability, action or proceeding as such expenses are incurred; provided, however, that the indemnity agreement contained in this Section 2.8(a) shall not apply to amounts paid in settlement of any such loss, claim, damage, liability, action or proceeding if such settlement is effected without the consent of the Company (which consent shall not be unreasonably withheld), nor shall the Company be liable in any such case for any such loss, claim, damage, liability, action or proceeding to the extent that it arises out of or is based upon a Violation that occurs in reliance upon, and in conformity with, written information furnished expressly for use in connection with such registration by any such Holder, underwriter, controlling Person or other aforementioned Person.

(b) To the extent permitted by law, each selling Holder will indemnify and hold harmless the Company, each of its directors, each of its officers who has signed the registration statement, each Person, if any, who controls the Company within the meaning of the Act, legal counsel and accountants for the Company, any underwriter, any other Holder selling securities in such registration statement and any controlling Person of any such underwriter or other Holder, against any losses, claims, damages or liabilities (joint or several) to which any of the foregoing Persons may become subject, under the Act, the 1934 Act, any state securities laws or any rule or regulation promulgated under the Act, the 1934 Act or any state securities laws, insofar as such losses, claims, damages or liabilities (or actions or proceedings, whether commenced or threatened, in respect thereof) arise out of or are based upon any Violation, in each case to the extent (and only to the extent) that such Violation occurs in reliance upon and in conformity with written information furnished by such Holder expressly for use in connection with such registration; and each such Holder will reimburse any Person intended to be indemnified pursuant to this Section 2.8(b) for any legal or other expenses reasonably incurred by such Person in connection with investigating or defending any such loss, claim, damage, liability, action or proceeding as such expenses are incurred; provided, however, that the indemnity agreement contained in this Section 2.8(b) shall not apply to amounts paid in settlement of any such loss, claim, damage, liability, action or proceeding if such settlement is effected without the consent of the Holder (which consent shall not be unreasonably withheld), and provided that in no event shall any indemnity under this Section 2.8(b) exceed the net proceeds from the offering received by such Holder, except in the case of fraud or willful misconduct by such Holder.

(c) Promptly after receipt by an indemnified party under this Section 2.8 of notice of the commencement of any action or proceeding (including any governmental action or proceeding) for which a party may be entitled to indemnification, such indemnified party will, if a claim in respect thereof is to be made against any indemnifying party under this Section 2.8, deliver to the indemnifying party a written notice of the commencement thereof and the indemnifying party shall have the right to participate in and, to the extent the indemnifying party so desires, jointly with any other indemnifying party similarly noticed, to assume the defense thereof with counsel mutually satisfactory to the parties; provided, however, that an indemnified party (together with all other indemnified parties that may be represented without conflict by one counsel) shall have the right to retain one (1) separate counsel, with the fees and expenses to be paid by the indemnifying party, if representation of such indemnified party by the counsel retained by the indemnifying party would be inappropriate due to actual or potential differing interests between such indemnified party and any other party represented by

such counsel in such proceeding. The failure to deliver written notice to the indemnifying party within a reasonable time of the commencement of any such action or proceeding, if prejudicial to its ability to defend such action or proceeding, shall relieve such indemnifying party of any liability to the indemnified party under this Section 2.8 but only to the extent of such prejudice; provided, however, that the omission to so deliver written notice to the indemnifying party will not relieve such indemnifying party of any liability that it may have to any indemnified party otherwise than under this Section 2.8.

(d) If the indemnification provided for in this Section 2.8 is held by a court of competent jurisdiction to be unavailable to an indemnified party with respect to any loss, liability, claim, damage or expense referred to herein, then the indemnifying party, in lieu of indemnifying such indemnified party hereunder, shall contribute to the amount paid or payable by such indemnified party as a result of such loss, liability, claim, damage or expense in such proportion as is appropriate to reflect the relative fault of the indemnifying party on the one hand and the indemnified party on the other hand in connection with the statements or omissions that resulted in such loss, liability, claim, damage or expense, as well as any other relevant equitable considerations; provided, however, that (i) no contribution by any Holder, when combined with any amounts paid by such Holder pursuant to Section 2.8(b), shall exceed the net proceeds from the offering received by such Holder and (ii) no Person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Act) will be entitled to contribution from any Person who was not guilty of such fraudulent misrepresentation; and provided further that in no event shall a Holder's liability pursuant to this Section 2.8(d), when combined with the amounts paid or payable by such Holder pursuant to Section 2.8(b), exceed the proceeds from the offering received by such Holder (net of any expenses paid by such Holder). The relative fault of the indemnifying party and the indemnified party shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the indemnifying party or by the indemnified party and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission.

(e) Notwithstanding the foregoing, to the extent that the provisions on indemnification and contribution contained in the underwriting agreement entered into in connection with the underwritten public offering are in conflict with the foregoing provisions, the provisions in the underwriting agreement shall control.

(f) Unless otherwise superseded by an underwriting agreement entered into in connection with the underwritten public offering, the obligations of the Company and Holders under this Section 2.8 shall survive the completion of any offering of Registrable Securities in a registration statement under this Section 2 and otherwise shall survive the termination of this Agreement.

2.9 Reports Under the 1934 Act. With a view to making available to the Holders the benefits of Rule 144 and any other rule or regulation of the SEC that may at any time permit a Holder to sell securities of the Company to the public without registration or pursuant to a registration on Form S-3, the Company agrees to:

(a) make and keep public information available, as those terms are understood and defined in Rule 144, at all times after the effective date of the registration statement filed by the Company for the Initial Offering;

(b) use best efforts to file with the SEC in a timely manner all reports and other documents required of the Company under the Act and the 1934 Act (at any time after the Company has become subject to such reporting requirements); and

(c) furnish to any Holder, so long as the Holder owns any Registrable Securities, forthwith upon request (i) to the extent accurate, a written statement by the Company that it has complied with the reporting requirements of Rule 144 (at any time after ninety (90) days after the effective date of the first registration statement filed by the Company), the Act and the 1934 Act (at any time after it has become subject to such reporting requirements), or that it qualifies as a registrant whose securities may be resold pursuant to Form S-3 (at any time after it so qualifies), (ii) a copy of the most recent annual or quarterly report of the Company and such other reports and documents so filed by the Company and (iii) such other information as may be reasonably requested to avail any Holder of any rule or regulation of the SEC that permits the selling of any such securities without registration (at any time after the Company has become subject to the reporting requirements under the Exchange Act) or pursuant to Form S-3 (at any time after the Company so qualifies to use such form).

2.10 Assignment of Registration Rights. The rights to cause the Company to register Registrable Securities pursuant to this Section 2 may be assigned (but only with all related obligations) by a Holder to a transferee or assignee of such securities that after such transfer, holds at least 100,000 shares of Registrable Securities (subject to appropriate adjustment for stock splits, stock dividends, combinations, and other recapitalizations), provided: (a) the Company is, within a reasonable time prior to such transfer, furnished with written notice of the name and address of such transferee or assignee and the securities with respect to which such registration rights are being assigned; (b) such transferee or assignee agrees in writing to be bound by and subject to the terms and conditions of this Agreement, including, without limitation, the provisions of Section 2.12 of this Agreement; and (c) such transferee or assignee is not a person deemed by the Board, in its reasonable judgment, to be a competitor or potential competitor of the Company; provided, however, that for purposes of this Section 2.10 "competitor" of the Company shall not include Gilead Sciences, Inc. ("Gilead") or any other entity that is wholly-owned, either directly or indirectly, by Gilead as of the date of this Agreement. Notwithstanding the limitation set forth in the foregoing sentence respecting the minimum number of shares which must be transferred, any Holder that (i) is a partnership, limited liability company or corporation may transfer such Holder's Registration rights to (A) entities affiliated directly or indirectly with such partnership (or its manager), limited liability company or corporation, (B) any partner (or retired partner or incoming partner), member (or retired member) or stockholder of such partnership, limited liability company or corporation, (C) the spouse, siblings, lineal descendants or ancestors of any such partner (or retired partner), member (or retired member) or stockholder, (D) the estate of any such partner (or retired partner), member (or retired member) or stockholder, (E) any custodian or trustee for the benefit of any such partner (or retired partner), member (or retired member) or stockholder or the spouse, siblings, lineal descendants or ancestors of any such partner (or retired partner), member (or retired member) or stockholder, as the case may be and (F) any Affiliate, or (ii) holds shares

in its capacity as trustee, manager or custodian of a trust, may transfer such Holder's rights to cause the Company to register Registrable Securities to a replacement trustee, manager or custodian of the relevant trust, in each case, without restriction as to the number or percentage of shares acquired by any such transferee.

2.11 Limitations on Subsequent Registration Rights. From and after the date of this Agreement, the Company shall not, without the prior written consent of the Required Holders, enter into any agreement with any holder or prospective holder of any securities of the Company that would allow such holder or prospective holder (a) to include any of such securities in any registration filed under Section 2.1, Section 2.2 or Section 2.3 of this Agreement, unless under the terms of such agreement, such holder or prospective holder may include such securities in any such registration only to the extent that the inclusion of such securities will not reduce the amount of the Registrable Securities of the Holders that are included or (b) to demand registration of their securities.

2.12 "Market Stand-Off" Agreement.

(a) Each Holder hereby agrees that it will not, without the prior written consent of the managing underwriter, during the period commencing on the date of the final prospectus relating to the Initial Offering and ending on the date specified by the Company and the managing underwriter (such period not to exceed one hundred eighty (180) days) (i) lend, offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, or otherwise transfer or dispose of, directly or indirectly, any shares of Common Stock or any securities convertible into or exercisable or exchangeable for Common Stock, in each case, held immediately before the effective date of the registration statement for such offering, or (ii) enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of the Common Stock, whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of Common Stock or other securities, in cash or otherwise. The foregoing provisions of this Section 2.12 shall apply only to the Initial Offering, shall not apply to the sale of any shares to an underwriter pursuant to an underwriting agreement, and shall only be applicable to the Holders if all officers and directors are subject to the same restrictions and the Company uses best efforts to obtain a similar agreement from all stockholders individually owning greater than one percent (1%) of the Company's outstanding Common Stock (after giving effect to conversion into Common Stock of all outstanding Preferred Stock). The underwriters in connection with the Initial Offering are intended third-party beneficiaries of this Section 2.12 and shall have the right, power and authority to enforce the provisions hereof as though they were a party hereto. Each Holder further agrees to execute such agreements as may be reasonably requested by the underwriters in the Initial Offering that are consistent with this Section 2.12 or that are necessary to give further effect thereto. Any discretionary waiver or termination of the restrictions of any or all of such agreements by the Company or the underwriters shall apply to all Holders subject to such agreements pro rata based on the number of shares subject to such agreements.

In order to enforce the foregoing covenant, the Company may impose stop-transfer instructions with respect to the Registrable Securities of each Holder (and the

shares or securities of every other Person subject to the foregoing restriction) until the end of such period.

(b) Each Holder agrees that a legend reading substantially as follows shall be placed on all certificates representing all shares or securities of the Company of each Holder (and the shares or securities of every other Person subject to the restriction contained in this Section 2.12):

THE SECURITIES REPRESENTED BY THIS CERTIFICATE ARE SUBJECT TO A LOCK-UP PERIOD AFTER THE EFFECTIVE DATE OF THE ISSUER'S REGISTRATION STATEMENT FILED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AS SET FORTH IN AN AGREEMENT BETWEEN THE COMPANY AND THE ORIGINAL HOLDER OF THESE SECURITIES, A COPY OF WHICH MAY BE OBTAINED AT THE ISSUER'S PRINCIPAL OFFICE. SUCH LOCK-UP PERIOD IS BINDING ON TRANSFEREES OF THESE SHARES.

2.13 Termination of Registration Rights. No Holder shall be entitled to exercise any right provided for in this Section 2: (a) after five (5) years following the consummation of a firm commitment underwritten public offering of shares of Common Stock of the Company at a price per share to the public of at least $6.01 (adjusted for stock splits, stock dividends, recapitalizations and similar events, including any such events to be effected in connection with such offering) resulting in aggregate proceeds to the Company (net of the underwriting discounts or commissions and offering expenses) of not less than $50,000,000 (a "Qualified IPO") or (b) as to any Holder, such time following a Qualified IPO at which both (i) such Holder (together with its Affiliates) holds one percent (1%) or less of the Company's outstanding Common Stock and (ii) all Registrable Securities held by such Holder (together with any Affiliate of the Holder with whom such Holder must aggregate its sales under Rule 144) can be sold in any three (3) month period without registration or volume limitations in compliance with Rule 144.

3. Covenants of the Company.

3.1 Delivery of Financial Statements.

(a) The Company shall deliver to each Investor (or transferee of an Investor):

(i) as soon as practicable, but in any event within one hundred twenty (120) days after the end of each fiscal year of the Company, a consolidated income statement for such fiscal year, a consolidated balance sheet of the Company and consolidated statement of stockholders' equity as of the end of such year, and a consolidated statement of cash flows for such year, such year-end financial reports to be in reasonable detail, prepared in accordance with generally accepted accounting principles ("GAAP"), audited and certified by independent public accountants of nationally recognized standing selected by the Company; and

(ii) as soon as practicable, but in any event within forty-five (45) days after the end of each of the first three (3) quarters of each fiscal year of the Company,

an unaudited consolidated income statement and statement of cash flows for such fiscal quarter and for the current fiscal year to date, and an unaudited balance sheet as of the end of such fiscal quarter (the "Quarterly Financial Statements"), all prepared in accordance with GAAP (except that such financial statements may (A) be subject to normal year-end audit adjustments and (B) not contain all notes thereto that may be required in accordance with GAAP).

(b) The Company shall deliver to each Investor (or transferee of an Investor) that holds at least 1,000,000 shares of Registrable Securities (appropriately adjusted for any stock split, dividend, combination or other recapitalization) (a "Major Investor"):

(i) as soon as practicable, but in any event at least thirty (30) days prior to the end of each fiscal year, an operating budget and business plan (the "Business Plan") for the next fiscal year, approved by the Board and prepared on a quarterly basis, as well as a summary of the Business Plan together with any update of the Business Plan as such update is prepared, including consolidated balance sheets, income statements and statements of cash flows for such months and, as soon as prepared, any other budgets or revised budgets prepared by the Company;

(ii) concurrently with the delivery of the Quarterly Financial Statements, a comparison of the Quarterly Financial Statements against the Business Plan, as then updated and in effect;

(iii) such other information relating to the financial condition, business or corporate affairs of the Company as the Major Investor may from time to time reasonably request; provided, however, that the Company shall not be obligated under this subsection (ii) to provide information that (A) it deems in good faith to be a trade secret or similar confidential information or (B) the disclosure of which would adversely affect the attorney-client privilege between the Company and its counsel.

3.2 Inspection. The Company shall permit each Major Investor, at such Major Investor's expense, and after reasonable notice provided by such Major Investor, to visit and inspect the Company's properties, to examine its books of account and records and to discuss the Company's affairs, finances and accounts with its officers, all at such reasonable times as may be requested by the Major Investor; provided, however, that the Company shall not be obligated pursuant to this Section 3.2 to provide access to any information that (A) it deems in good faith to be a trade secret or similar confidential information or (B) the disclosure of which would adversely affect the attorney-client privilege between the Company and its counsel.

3.3 Observer Rights. As long as F-Prime Capital Partners Healthcare Fund IV LP, together with its Affiliates ("F-Prime"), owns not less than 1,500,000 shares of Preferred Stock (as adjusted for stock dividends, combinations, splits or the like), the Company shall invite a representative of F-Prime (the "F-Prime Investor Observer") to attend all meetings of its Board in a nonvoting observer capacity. As long as Brace Pharmaceuticals LLC, together with its Affiliates ("Brace"), owns not less than 1,500,000 shares of Preferred Stock (as adjusted for stock dividends, combinations, splits or the like), the Company shall invite a representative of Brace (the "Brace Investor Observer") to attend all meetings of its Board in a nonvoting capacity. As long as Cowen Healthcare Investments II LP and CHI EF II LP, together with their

Affiliates ("Cowen"), owns not less than 1,500,000 shares of Preferred Stock (as adjusted for stock dividends, combinations, splits or the like), the Company shall invite a representative of Cowen (the "Cowen Investor Observer" and together with the F-Prime Investor Observer and the Brace Observer, the "Investor Observers" and each an "Investor Observer") to attend all meetings of its Board in a nonvoting observer capacity. The initial F-Prime Investor Observer shall be Ben Auspitz. The initial Brace Investor Observer shall be Todd Brady. In this respect, the Company shall give each Investor Observer copies of all notices and other materials that it provides to its directors at the same time and in the same manner as provided to such directors; provided, however, that such representative shall agree to hold in confidence and trust and to act as a fiduciary with the same standard of care as a member of the Board with respect to all information so provided; and provided further, that the Company reserves the right to exclude any Investor Observer from any meeting, or any portion thereof, and/or to exclude some or all of the materials to be sent to such Investor Observer, if the Board determines in good faith that attendance at such meeting, or portion thereof, and/or providing such materials or any portion thereof, could materially and adversely affect the Company, whether by way of adversely affecting the attorney-client privilege between the Company and its counsel, or otherwise.

3.4 Termination of Information, Inspection and Observer Covenants. The covenants set forth in Sections 3.1, 3.2 and 3.3 shall terminate and be of no further force or effect upon the earlier to occur of (a) the consummation of a Qualified IPO, (b) when the Company first becomes subject to the periodic reporting requirements of Sections 12(g) or 15(d) of the 1934 Act and (c) the consummation of a Liquidation Event, as that term is defined in the Restated Certificate, whichever event shall first occur. The confidentiality provisions under Section 3.3 will survive any such termination.

3.5 Right of First Offer. Subject to the terms and conditions specified in this Section 3.5, the Company hereby grants to each Major Investor a right of first offer with respect to future sales by the Company of its Shares (as hereinafter defined). A Major Investor shall be entitled to apportion the right of first offer hereby granted it among itself and its partners and Affiliates in such proportions as it deems appropriate.

Each time the Company proposes to offer any shares of, or securities convertible into or exchangeable or exercisable for any shares of, its capital stock ("Shares"), the Company shall first make an offering of such Shares to each Major Investor in accordance with the following provisions:

(a) The Company shall deliver a notice in accordance with Section 4.5 ("Notice") to the Major Investors stating (i) its bona fide intention to offer such Shares, (ii) the number of such Shares to be offered and (iii) the price and terms upon which it proposes to offer such Shares.

(b) By written notification received by the Company within thirty (30) calendar days after the giving of Notice, each Major Investor may elect to purchase, at the price and on the terms specified in the Notice, up to that portion of such Shares that equals the proportion that the number of shares of Registrable Securities issued and held by such Investor (assuming full conversion and exercise of all convertible and exercisable securities then outstanding, but excluding unexercised options) bears to the total number of shares of Common

Stock of the Company then outstanding (assuming full conversion and exercise of all convertible and exercisable securities then outstanding, but excluding unexercised options). At the expiration of such thirty (30) calendar day period, the Company shall promptly, in writing, notify each Major Investor that elects to purchase all the shares available to it (a "Fully-Exercising Investor") of any other Major Investor's failure to do likewise. During the fifteen (15) calendar day period commencing after the Company has given such notice to the Fully-Exercising Investors, each Fully-Exercising Investor may elect to purchase that portion of the Shares for which Major Investors were entitled to subscribe, but which were not subscribed for by the Major Investors, that is equal to the proportion that the number of shares of Registrable Securities issued and held by such Fully-Exercising Investor bears to the total number of shares of Common Stock issued and held, or issuable upon conversion of the Preferred Stock then held, by all Fully-Exercising Investors who wish to purchase some of the unsubscribed shares.

(c) If all Shares that Major Investors are entitled to obtain pursuant to Section 3.5(b) of this Agreement are not elected to be obtained as provided in Section 3.5(b) of this Agreement, the Company may, during the sixty (60) day period following the expiration of the period provided in Section 3.5(b) of this Agreement, offer the remaining unsubscribed portion of such Shares to any Person or Persons at a price not less than that, and upon terms no more favorable to the offeree than those, specified in the Notice. If the Company does not enter into an agreement for the sale of the Shares within such period, or if such agreement is not consummated within thirty (30) days of the execution thereof, the right provided hereunder shall be deemed to be revived and such Shares shall not be offered unless first reoffered to the Investors in accordance herewith.

(d) The right of first offer in this Section 3.5 shall not be applicable to (i) Shares issued as a dividend or distribution on Preferred Stock or upon conversion of the Preferred Stock; (ii) Shares issued pursuant to a transaction described in Article IV.B Section 4(d)(i) of the Restated Certificate; (iii) Shares issued or granted to employees, directors, consultants and other service providers for the primary purpose of soliciting or retaining their services pursuant to this Corporation's equity incentive or option plans or any other plan or agreement approved by the Board (including the approval of at least one Preferred Director); (iv) Common Stock issued to the public in a firm commitment underwritten public offering pursuant to an effective registration statement filed under the Securities Act of 1933, as amended; (v) Shares issued pursuant to the conversion or exercise of convertible or exercisable securities outstanding as of the date of this Agreement or excluded from the rights of first offer pursuant to this Section 3.5(d); (vi) Shares issued in connection with a bona fide business acquisition by the Company, whether by merger, consolidation, sale of assets, sale or exchange of stock or otherwise, provided that such issuance is approved by the Board (including the approval of at least one Preferred Director); (vii) Shares issued pursuant to any equipment leasing arrangement, real estate, bank financing or similar arrangement, which arrangement is approved by the Board (including the approval of at least one Preferred Director); (viii) Shares issued to persons or entities with which this Corporation has business or partnering relationships, provided such issuances are approved by the Board (including the approval of at least one Preferred Director) and are primarily for non-equity financing purposes; (ix) the issuance of shares of Series B Stock to Additional Purchasers pursuant to Section 1.3 of the Purchase Agreement or (x) shares of Common Stock issued in a Qualified IPO. In addition to the foregoing, the right of first offer in this Section 3.5 shall not be applicable with respect to any Investor in any subsequent offering of

Shares if (i) at the time of such offering, the Investor is not an "accredited investor," as that term is then defined in Rule 501(a) of the Act and (ii) such offering of Shares is otherwise being offered only to accredited investors.

(e) The rights provided in this Section 3.5 may not be assigned or transferred by any Major Investor; provided, however, that a Major Investor that is a venture capital, hedge or private equity style fund may assign or transfer such rights to its Affiliates.

(f) The covenants set forth in this Section 3.5 shall terminate and be of no further force or effect upon the consummation of (i) a Qualified IPO or (ii) a Liquidation Event, as that term is defined in the Restated Certificate.

3.6 Insurance.

(a) Key-Person Insurance. The Company has as of the date hereof term life insurance on the life of Derek Jantz in an amount of at least $1,000,000. Such policies are owned by the Company and name the Company as loss payee. The Company will use its best efforts to cause such term life insurance policies be maintained until such time as the Board determines that such insurance should be discontinued.

(b) Directors' and Officers' Insurance. The Company has as of the date hereof directors' and officers' liability insurance in an amount equal to $3,000,000. The Company will use its best efforts to cause such insurance policy be maintained until such time as the Board determines that such insurance should be discontinued.

3.7 Proprietary Information and Inventions Agreements. The Company shall require all employees and consultants with access to confidential information to execute and deliver a Proprietary Information and Inventions Agreement in substantially the form approved by the Board or a consulting agreement containing substantially similar proprietary rights assignment and confidentiality provisions.

3.8 Matters Requiring Director Approval. So long as the holders of Preferred Stock are entitled to elect a Preferred Director, the Company hereby covenants and agrees with each of the Investors that it shall not, without approval of the Board, including at least one Preferred Director:

(a) make, or permit any subsidiary to make, any loan or advance to, or own any stock or other securities of, any subsidiary or other corporation, partnership, or other entity unless it is wholly owned by the Company;

(b) make, or permit any subsidiary to make, any loan or advance to any Person, including, without limitation, any employee or director of the Company or any subsidiary, except advances and similar expenditures in the ordinary course of business or under the terms of an employee stock or option plan approved by the Board;

(c) incur, guarantee, directly or indirectly, or permit any subsidiary to incur, guarantee, directly or indirectly, any indebtedness (including operating and capital leases)

greater than $5,000,000 except for trade accounts of the Company or any subsidiary arising in the ordinary course of business;

(d) otherwise enter into or be a party to any transaction with any director, officer, or employee of the Company or any "associate" (as defined in Rule 12b-2 promulgated under the 1934 Act) of any such Person, except for transactions contemplated by this Agreement, the Purchase Agreement, that certain Amended and Restated Voting Agreement executed as of even date herewith, and that certain Amended and Restated Right of First Refusal and Co-Sale Agreement executed as of even date herewith or transactions made in the ordinary course of business and pursuant to reasonable requirements of the Company's business and upon fair and reasonable terms that are approved by a majority of the Board;

(e) hire, terminate, or materially change the compensation of the executive officers, including approving any option grants or stock awards to executive officers;

(f) materially change the principal business of the Company, enter new lines of business, or exit the current line of business;

(g) create any subsidiary of the Corporation; or

(h) enter into any corporate strategic relationship involving the payment, contribution, or assignment by the Company or to the Company of money or assets greater than $5,000,000.

3.9 Board Matters. Unless otherwise determined by the vote of a majority of the directors then in office, the Board shall meet at least quarterly in accordance with an agreed-upon schedule. The Company shall reimburse the nonemployee directors and any person with contractual board observer rights for all reasonable out-of-pocket travel and other expenses incurred (consistent with the Company's travel policy, if any) in support of the Company or in connection with the performance of duties as directors, including, without limitation, attending meetings of the Board or committees thereof. Promptly after the date hereof, the Board will form compensation, audit and nominating and corporate governance committees.

3.10 Successor Indemnification. If the Company or any of its successors or assignees consolidates with or merges into any other Person or entity and is not the continuing or surviving corporation or entity of such consolidation or merger, then to the extent necessary, proper provision shall be made so that the successors and assignees of the Company assume the obligations of the Company with respect to indemnification of members of the Board as in effect immediately before such transaction, whether such obligations are contained in the Company's Bylaws, its Certificate of Incorporation, or elsewhere, as the case may be.

3.11 Confidentiality. Each Investor agrees, severally and not jointly, to use the same degree of care as such Investor uses to protect its own confidential information for any information obtained pursuant to this Agreement or otherwise as a stockholder of the Company which the Company identifies in writing as being proprietary or confidential and such Investor acknowledges that it will not, unless otherwise required by law or the rules of any national securities exchange, association or marketplace, disclose such information without the prior written consent of the Company except such information that (a) was in the public domain prior

to the time it was furnished to such Investor, (b) is or becomes (through no willful improper action or inaction by such Investor) generally available to the public, (c) was in its possession or known by such Investor without restriction prior to receipt from the Company, (d) was rightfully disclosed to such Investor by a third party without restriction or (e) was independently developed without any use of the Company's confidential information. Notwithstanding the foregoing, each Investor that is a limited partnership or limited liability company may disclose such proprietary or confidential information to any former partners or members who retained an economic interest in such Investor, current or prospective partner of the partnership or any subsequent partnership under common investment management, limited partner, general partner, member or management company of such Investor (or any employee or representative of any of the foregoing) (each of the foregoing Persons, a "Permitted Disclosee") or legal counsel, accountants or representatives for such Investor. Furthermore, nothing contained herein shall prevent any Investor or any Permitted Disclosee from (i) entering into any business, entering into any agreement with a third party, or investing in or engaging in investment discussions with any other company (whether or not competitive with the Company), provided that such Investor or Permitted Disclosee does not, except as permitted in accordance with this Section 3.11, disclose or otherwise make use of any proprietary or confidential information of the Company in connection with such activities, or (ii) making any disclosures required by law, rule, regulation or court or other governmental order.

3.12 Bad Actor Status. The Company will notify the Investors promptly in writing in the event the Company has knowledge that a "Bad Actor" disqualifying event described in Rule 506(d)(1)(i) to (viii) of the Securities Act (a "Disqualification Event") becomes applicable to the Company, except for a Disqualification Event as to which Rule 506(d)(2)(ii)-(iv) or (d)(3) is applicable.

3.13 Employee Agreements. The Company will cause (i) each person now or hereafter employed by it or by any subsidiary (or engaged by the Company or any subsidiary as a consultant/independent contractor) with access to confidential information and/or trade secrets to enter into a nondisclosure and proprietary rights assignment agreement; and (ii) each Key Employee to enter into a one (1) year noncompetition and nonsolicitation agreement, substantially in the form approved by the Board, provided, however, that any employee that has entered into an employment agreement with the Company that contains provisions regarding the subject matter in the foregoing clauses (i) and (ii) shall not be required to enter into a nondisclosure and proprietary rights assignment agreement or enter into a noncompetition and nonsolicitation agreement. In addition, the Company shall not amend, modify, terminate, waive, or otherwise alter, in whole or in part, any of the above-referenced agreements or any restricted stock agreement between the Company and any employee, without the consent of at least one Preferred Director.

3.14 Employee Stock. Unless otherwise approved by the Board, including at least one Preferred Director, all future employees and consultants of the Company who purchase, receive options to purchase, or receive awards of shares of the Company's capital stock after the date hereof shall be required to execute restricted stock or option agreements, as applicable, providing for (i) vesting of shares over a four (4) year period, with the first twenty-five percent (25%) of such shares vesting following twelve (12) months of continued employment or service, and the remaining shares vesting in equal monthly installments over the following thirty-six (36)

months, and (ii) a market stand-off provision substantially similar to that in Section 2.12. In addition, unless otherwise approved by the Board, including at least one Preferred Director, the Company shall retain a "right of first refusal" on employee transfers until the Initial Offering and shall have the right to repurchase unvested shares at cost upon termination of employment of a holder of restricted stock.

3.15 Indemnification Matters. The Company hereby acknowledges that one (1) or more of the directors nominated to serve on the Board by the Investors (each a "Fund Director") may have certain rights to indemnification, advancement of expenses and/or insurance provided by one or more of the Investors and certain of their affiliates (collectively, the "Fund Indemnitors"). The Company hereby agrees (a) that it is the indemnitor of first resort (*i.e.*, its obligations to any such Fund Director are primary and any obligation of the Fund Indemnitors to advance expenses or to provide indemnification for the same expenses or liabilities incurred by such Fund Director are secondary), (b) that it shall be required to advance the full amount of expenses incurred by such Fund Director and shall be liable for the full amount of all expenses, judgments, penalties, fines and amounts paid in settlement by or on behalf of any such Fund Director to the extent legally permitted and as required by the Restated Certificate (or any agreement between the Company and such Fund Director), without regard to any rights such Fund Director may have against the Fund Indemnitors, and, (c) that it irrevocably waives, relinquishes and releases the Fund Indemnitors from any and all claims against the Fund Indemnitors for contribution, subrogation or any other recovery of any kind in respect thereof. The Company further agrees that no advancement or payment by the Fund Indemnitors on behalf of any such Fund Director with respect to any claim for which such Fund Director has sought indemnification from the Company shall affect the foregoing and the Fund Indemnitors shall have a right of contribution and/or be subrogated to the extent of such advancement or payment to all of the rights of recovery of such Fund Director against the Company.

3.16 Right to Conduct Activities. The Company hereby agrees and acknowledges that (A) each of ArrowMark Colorado Holdings, LLC (together with its Affiliates "AP"), venBio Partners, LLC (together with its Affiliates, "venBio"), Osage University Partners II (together with its Affiliates, "Osage"), G LTP LLC, G HSP LLC, G ERP LLC and G JBD LLC (together with their Affiliates, "DUMAC"), RA Capital Healthcare Fund, L.P. (together with its Affiliates, "RA Capital"), Franklin Strategic Series – Franklin Biotechnology Discovery Fund and Franklin Templeton Investment Funds – Franklin Biotechnology Discovery Fund (together with their Affiliates, "Franklin"), Agent Capital Fund I LP (together with its Affiliates, "Agent Capital"), Vivo Panda Fund, L.P. (together with its Affiliates, "Vivo Panda"), Brace and F-Prime (collectively with AP, venBio, Osage, DUMAC, RA Capital, Franklin, Agent Capital, Vivo Panda and Brace, the "Investments Funds") is a professional investment fund, and as such invests in numerous portfolio companies, some of which may be deemed competitive with the Company's business (as currently conducted or as currently propose to be conducted) and (B) that Gilead is a public company with numerous business lines and an active investment and acquisition program (together, the "Other Gilead Business"). The Company hereby agrees that, to the extent permitted under applicable law, none of the Investment Funds nor Gilead or any of its Affiliates (together, the "Gilead Group") shall be liable to the Company for any claim arising out of, or based upon, (i) the investment by any Investment Fund or the Gilead Group in any entity competitive with the Company, (ii) actions taken by any partner, officer or other representative of any Investment Fund the Gilead Group to assist any such competitive company,

whether or not such action was taken as a member of the board of directors of such competitive company or otherwise, and whether or not such action has a detrimental effect on the Company or (iii) with respect to the Gilead Group, the Gilead Group engaging in Other Gilead Business; provided, however, that the foregoing shall not relieve (x) any of the Investors from liability associated with the unauthorized disclosure by the Investors (or any of their affiliates) of the Company's confidential information obtained pursuant to this Agreement, or (y) any director or officer of the Company from any liability associated with his or her fiduciary duties to the Company.

3.17 Termination of Certain Covenants. The covenants set forth in Sections 3.7, 3.8, 3.12, 3.13, 3.14, shall terminate and be of no further force or effect upon the consummation of (a) a Qualified IPO or (ii) a Liquidation Event, as that term is defined in the Restated Certificate.

4. Miscellaneous.

4.1 Successors and Assigns. Except as otherwise provided herein, the terms and conditions of this Agreement shall inure to the benefit of and be binding upon the respective successors and assigns of the parties (including transferees of any shares of Registrable Securities). Nothing in this Agreement, express or implied, is intended to confer upon any party other than the parties hereto or their respective successors and assigns any rights, remedies, obligations or liabilities under or by reason of this Agreement, except as expressly provided in this Agreement.

4.2 Governing Law. This Agreement shall be interpreted under the laws of the State of Delaware without reference to Delaware conflicts of law provisions.

4.3 Counterparts; Facsimile. This Agreement may be executed in two (2) or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Counterparts may be delivered via facsimile, electronic mail (including pdf or any electronic signature complying with the U.S. federal ESIGN Act of 2000, *e.g.*, www.docusign.com) or other transmission method and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

4.4 Titles and Subtitles. The titles and subtitles used in this Agreement are used for convenience only and are not to be considered in construing or interpreting this Agreement.

4.5 Notices. All notices and other communications given or made pursuant hereto shall be in writing and shall be deemed effectively given: (a) upon personal delivery to the party to be notified, (b) when sent by confirmed electronic mail or facsimile if sent during normal business hours of the recipient; if not, then on the next business day, (c) five (5) days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (d) one (1) day after deposit with a nationally recognized overnight courier, specifying next day delivery, with written verification of receipt. All notices and other communications shall be sent to the Company and to the other parties at the addresses set forth on the signature pages

hereto (or at such other addresses as shall be specified by notice given in accordance with this Section 4.5). If notice is given to the Company, a copy (which shall not constitute notice) shall also be sent to Smith, Anderson, Blount, Dorsett, Mitchell & Jernigan, L.L.P., Wells Fargo Capitol Center, 150 Fayetteville St., Suite 2300, Raleigh, NC 27601, Attention: Michael P. Saber, Facsimile No. (919) 821-6800; and if notice is given to the Investors, a copy (which shall not constitute notice) shall also be given to Tannenbaum Helpern Syracuse & Hirschtritt LLP, 900 Third Avenue, New York, NY 10022, Attention: James Rieger, Facsimile No. (212) 371-1084.

4.6 Entire Agreement; Amendments and Waivers. This Agreement (including the Exhibits hereto, if any) constitutes the full and entire understanding and agreement among the parties with regard to the subjects hereof and thereof, and supersedes all other agreements between or among any of the parties with respect to the subject matter hereof and thereof, including the Prior Agreement. Any term of this Agreement (other than Section 3.1, Section 3.2, Section 3.3, Section 3.4 and Section 3.16) may be amended and the observance of any term of this Agreement may be waived (either generally or in a particular instance and either retroactively or prospectively) only with the written consent of (a) the Company and (b) the Required Holders. The provisions of Section 3.1 and Section 3.2 may be amended or waived (either generally or in a particular instance and either retroactively or prospectively) only with the written consent of the Company and the Major Investors holding at least sixty percent (60%) of the Registrable Securities then held by all of the Major Investors. The provisions of Section 2.10, Section 3.4, Section 3.15 and Section 3.16 may be amended or waived only with the written consent of (a) the Company and (b) if such amendment or waiver adversely affects venBio, AP, Brace, F-Prime, Franklin, Osage, DUMAC, RA Capital, Agent Capital, Vivo Panda and/or Gilead, such adversely affected party. The provisions of Section 3.3 may be amended or waived only with the written consent of the Company and, if such amendment or waiver adversely affects F-Prime, Cowen and/or Brace, such adversely affected party. Notwithstanding the foregoing, this Agreement may not be amended, modified or terminated and the observance of any term hereof may not be waived with respect to any Investor without the written consent of such Investor, unless such amendment, modification, termination, or waiver applies to all Investors in the same fashion (it being agreed that a waiver of the provisions of Section 3.5 (Right of First Offer) with respect to a particular transaction shall be deemed to apply to all Investors in the same fashion if such waiver does so by its terms, notwithstanding the fact that certain Investors may nonetheless, by agreement with the Company, purchase securities in such transaction). Further, this Agreement may not be amended, and no provision hereof may be waived, in each case, in any way which would adversely affect the rights of the Common Holders hereunder in a manner disproportionate to any adverse effect such amendment or waiver would have on the rights of the Investors hereunder, without also obtaining the written consent of the Common Holders holding a majority of the shares of Common Stock then held by all Common Holders who are then providing services to the Company as officers or employees in good standing. Any amendment or waiver effected in accordance with this paragraph shall be binding upon each holder of any Registrable Securities, each future holder of all such Registrable Securities and the Company.

4.7 Waiver of Rights of First Offer. Pursuant to Sections 3.5 and 4.6 of the Prior Agreement, the Investors having rights of first offer under the Prior Agreement hereby waive, on behalf of all parties having such rights thereunder, all rights they may have under

Section 3.5 of the Prior Agreement with respect to the issuance and sale of the Series B Stock pursuant to the Purchase Agreement and the Common Stock issuable to the purchasers of the Series B Stock pursuant to the Purchase Agreement, including, without limitation, their right to receive notice pursuant to Section 3.5(a) of the Prior Agreement and their right of first offer pursuant to Section 3.5 of the Prior Agreement.

4.8 Severability. Whenever possible, each provision of this Agreement shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement shall be held to be prohibited by or invalid under applicable law, such provision shall be ineffective only to the extent of such prohibition or invalidity, without invalidating the remainder of such provision or the remaining provisions of this Agreement.

4.9 Aggregation of Stock. All shares of Registrable Securities held or acquired by affiliated entities (including affiliated venture capital, hedge and private equity style funds or venture capital, hedge or private equity style funds under common investment management) or Persons shall be aggregated together for the purpose of determining the availability of any rights under this Agreement.

4.10 Additional Investors. Notwithstanding Section 4.6, no consent shall be necessary to add additional Investors as signatories to this Agreement and to update Schedule A accordingly, provided that such Investors have purchased Series B Stock pursuant to the subsequent closing provisions of Section 1.3 of the Purchase Agreement. Schedule A shall be updated without any action of the Investors to reflect such additional Investors.

4.11 WAIVER OF JURY TRIAL. EACH PARTY HEREBY WAIVES ITS RIGHTS TO A JURY TRIAL OF ANY CLAIM OR CAUSE OF ACTION BASED UPON OR ARISING OUT OF THIS AGREEMENT, THE OTHER AGREEMENTS TO BE EXECUTED IN CONNECTION WITH THE EXECUTION OF THIS AGREEMENT, THE REGISTRABLE SECURITIES OR THE SUBJECT MATTER HEREOF OR THEREOF. THE SCOPE OF THIS WAIVER IS INTENDED TO BE ALL-ENCOMPASSING OF ANY AND ALL DISPUTES THAT MAY BE FILED IN ANY COURT AND THAT RELATE TO THE SUBJECT MATTER OF THE TRANSACTIONS CONTEMPLATED HEREBY, INCLUDING, WITHOUT LIMITATION, CONTRACT CLAIMS, TORT CLAIMS (INCLUDING NEGLIGENCE), BREACH OF DUTY CLAIMS, AND ALL OTHER COMMON LAW AND STATUTORY CLAIMS. THIS SECTION HAS BEEN FULLY DISCUSSED BY EACH OF THE PARTIES HERETO AND THESE PROVISIONS WILL NOT BE SUBJECT TO ANY EXCEPTIONS. EACH PARTY HERETO HEREBY FURTHER WARRANTS AND REPRESENTS THAT SUCH PARTY HAS REVIEWED THIS WAIVER WITH ITS LEGAL COUNSEL, AND THAT SUCH PARTY KNOWINGLY AND VOLUNTARILY WAIVES ITS JURY TRIAL RIGHTS FOLLOWING CONSULTATION WITH LEGAL COUNSEL.

[*Remainder of page intentionally left blank*]

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

COMPANY:

PRECISION BIOSCIENCES, INC.

By: /s/ Matthew Kane
Name: Matthew Kane
Title: President and Chief Executive Officer

Address:
302 E. Pettigrew Street, Suite A-100
Durham, NC 27701

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

COMMON HOLDERS:

DEREK JANTZ

/s/ Derek Jantz
Derek Jantz

MATTHEW KANE

/s/ Matthew Kane
Matthew Kane

JEFF SMITH

/s/ Jeff Smith
Jeff Smith

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

ADAGE CAPITAL PARTNERS, LP

By: Adage Capital Partners, GP, LLC
Its: General Partner

By: Adage Capital Advisors, LLC
Its: Managing Member

By: /s/ Dan Lehan
Name: Dan Lehan
Title: COO

Address:
200 Clarendon Street
52nd
Boston, MA 02116

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

AGENT CAPITAL FUND I LP

By: Agent Capital Fund I GP, LLC
Its: General Partner

By: /s/ Geeta Vemuri
Name: Geeta Vemuri
Title: Managing Member

Address:
810 Memorial Drive, Suite 107
Cambridge, MA-02139

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

ALEXANDRIA VENTURE INVESTMENTS, LLC

By: Alexandria Real Estate Equities, Inc.
Its: Managing Member

By: /s/ Aaron Jacobson
Name: Aaron Jacobson
Title: SVP – Venture Counsel

Address:
385 E. Colorado Blvd., Suite 299
Pasadena, CA 91101

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

AMGEN VENTURES, LLC

By: /s/ David A. Piacquad
Name: David A. Piacquad
Title: SVP, Business Development

Address:
c/o Amgen Inc.
One Amgen Center Drive
Thousand Oaks, CA 91320
Attn: Corporate Secretary

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

MERIDIAN GROWTH FUND

By: ArrowMark Colorado Holdings, LLC
Its: Investment Adviser

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

MERIDIAN SMALL CAP GROWTH FUND

By: ArrowMark Colorado Holdings, LLC
Its: Investment Adviser

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

ARROWMARK LIFE SCIENCE FUND, LP

By: AMP Life Science GP, LLC
Its: General Partner

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

ARROWMARK FUNDAMENTAL OPPORTUNITY FUND, L.P.

By: ArrowMark Partners GP, LLC
Its: General Partner

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

LOOKFAR INVESTMENTS, LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

CF ASCENT LLC

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

THB IRON ROSE, LLC

By: ArrowMark Colorado Holdings, LLC
Its: Investment Adviser

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

THB IRON ROSE, LLC LIFE SCIENCE PORTFOLIO

By: ArrowMark Colorado Holdings, LLC
Its: Investment Adviser

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

IRON HORSE INVESTMENTS, LLC

By: ArrowMark Colorado Holdings, LLC
Its: Investment Adviser

By: /s/ David Corkins
Name: David Corkins
Title: Managing Member

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

/s/ Tony Yao
Tony Yao

Address:
ArrowMark Partners
100 Fillmore Street, Suite 325
Denver, CO 80206

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

BRACE PHARMACEUTICALS LLC

By: /s/ Vinzenz Ploerer
Name: Vinzenz Ploerer
Title: President and CEO

Address:
155 Gibbs Street, Suite 406
Rockville, MD 20850

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

CORMORANT PRIVATE HEALTHCARE FUND I, LP

By: Cormorant Private Healthcare GP, LLC
Its: General Partner

By: /s/ Bihua Chen
Name: Bihua Chen
Title: Managing Member

Address:
200 Clarendon Street, 5nd Floor
Boston, MA 02116

CORMORANT GLOBAL HEALTHCARE MASTER FUND, LP

By: Cormorant Global Healthcare GP, LLC
Its: General Partner

By: /s/ Bihua Chen
Name: Bihua Chen
Title: Managing Member

Address:
200 Clarendon Street, 5nd Floor
Boston, MA 02116

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

CRMA SPV, L.P.

By: Cormorant Asset Management, LP
Its: Attorney-in-Fact

By: /s/ Bihua Chen
Name: Bihua Chen
Title: CEO/CIO

Address:
P.O. Box 309
Ugland House
Grand Cayman
KY1-1104 Cayman Islands

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

COWEN HEALTHCARE INVESTMENTS II LP

By: Cowen Healthcare Investments II GP LLC
Its: General Partner

By: /s/ Kevin Raidy
Name: Kevin Raidy
Title: Managing Partner

Address:
c/o Cowen Advisors, LLC
599 Lexington Avenue, 19th Floor
New York, NY 10022
Attention: Kevin Raidy

CHI EF II LP

By: Cowen Healthcare Investments II GP LLC
Its: General Partner

By: /s/ Kevin Raidy
Name: Kevin Raidy
Title: Managing Partner

Address:
c/o Cowen Advisors, LLC
599 Lexington Avenue, 19th Floor
New York, NY 10022
Attention: Kevin Raidy

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

G LTP LLC

By: /s/ Seth M. Posternak
Name: Seth M. Posternak
Title: Investment Manager
DUMAC, Inc. Authorized Agent

By: /s/ Jannine M. Lall
Name: Jannine M. Lall
Title: Controller
DUMAC, Inc. Authorized Agent

Address:
280 S. Mangum Street, Suite 210
Durham, NC 27701-3675

G HSP LLC

By: /s/ Seth M. Posternak
Name: Seth M. Posternak
Title: Investment Manager
DUMAC, Inc. Authorized Agent

By: /s/ Jannine M. Lall
Name: Jannine M. Lall
Title: Controller
DUMAC, Inc. Authorized Agent

Address:
280 S. Mangum Street, Suite 210
Durham, NC 27701-3675

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

G JBD LLC

By: /s/ Seth M. Posternak
Name: Seth M. Posternak
Title: Investment Manager
DUMAC, Inc. Authorized Agent

By: /s/ Jannine M. Lall
Name: Jannine M. Lall
Title: Controller
DUMAC, Inc. Authorized Agent

Address:
280 S. Mangum Street, Suite 210
Durham, NC 27701-3675

G ERP LLC

G ERP LLC, acting through the Duke University Defined Benefit Plan Master Trust
By: DUMAC, Inc., as authorized agent of the trustee of the master trust

By: /s/ Seth M. Posternak
Name: Seth M. Posternak
Title: Investment Manager
DUMAC, Inc. Authorized Agent

By: /s/ Jannine M. Lall
Name: Jannine M. Lall
Title: Controller
DUMAC, Inc. Authorized Agent

Address:
280 S. Mangum Street, Suite 210
Durham, NC 27701-3675

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

F-PRIME CAPITAL PARTNERS HEALTHCARE FUND IV LP

By: F-Prime Capital Partners Healthcare Advisors Fund IV LP
Its: General Partner

By: Impresa Holdings LLC
Its: General Partner

By: Impresa Management LLC
Its: Managing Member

By: /s/ Mary Bevelock Pendergast
Name: Mary Bevelock Pendergast
Title: Vice President

Address:
c/o F-Prime Capital
1 Main Street, 13th Floor
Cambridge, MA 02142

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

FRANKLIN TEMPLETON INVESTMENT FUNDS – FRANKLIN BIOTECHNOLOGY DISCOVERY FUND

By: Franklin Advisers, Inc.
Its: Investment Manager

By: /s/ Evan McCulloch
Name: Evan McCulloch
Title: Vice President

Address:
Franklin Templeton
Attn: Wendy Lam
One Franklin Parkway
San Mateo, CA 94403

FRANKLIN STRATEGIC SERIES – FRANKLIN BIOTECHNOLOGY DISCOVERY FUND

By: Franklin Advisers, Inc.
Its: Investment Manager

By: /s/ Evan McCulloch
Name: Evan McCulloch
Title: Vice President

Address:
Franklin Templeton
Attn: Wendy Lam
One Franklin Parkway
San Mateo, CA 94403

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

GILEAD SCIENCES, INC.

By: /s/ Robin L. Washington
Name: Robin L. Washington
Title: EVP, Chief Financial Officer

Address:
333 Lakeside Drive
Foster City, CA 94404
Attn: Andrew Dickinson, SVP, Corporate Dev.

With copy to:

Address:
Gilead Sciences, Inc.
333 Lakeside Drive
Foster City, CA 94404
Attn: General Counsel

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

LEERINK HOLDINGS LLC

By: /s/ Timothy A. G. Gerhold
Name: Timothy A. G. Gerhold
Title: General Counsel

Address:
One Federal Street, 37th Floor
Boston, MA 02110
Attn: General Counsel

LEERINK PARTNERS CO-INVESTMENT FUND, LLC

By: /s/ Jeffrey A. Leerink
Name: Jeffrey A. Leerink
Title: Manager

Address:
One Federal Street, 37th Floor
Boston, MA 02110
Attn: General Counsel

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

LONGEVITY FUND 1 LP

By: Longevity Funds LLC
Its: General Partner

By: /s/ Laura H. Deming
Name: Laura Deming
Title: Partner

Address:
555 Bryant St, Palo Alto CA 94301

LONGEVITY FUND 2 LP

By: Longevity Funds 2 LLC
Its: General Partner

By: /s/ Laura H. Deming
Name: Laura Deming
Title: Partner

Address:
555 Bryant St, Palo Alto CA 94301

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

/s/ Robert Millman
Robert Millman

Address:
404 Beacon Street, #4
Boston, MA 02115

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

OCV FUND I, L.P.

By: OCV I GP, LLC
Its: General Partner

By: /s/ Mark Yung
Name: Mark Yung
Title: M Principal

Address:
4700 Wilshire Blvd.
Los Angeles, CA 90010
Attn: Mark Yung

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

OSAGE UNIVERSITY PARTNERS II, LP

By: Osage University GP II, LLC
Its: General Partner

By: /s/ William Harrington
Name: William Harrington
Title: Member

Address:
50 Monument Road, Suite 201
Bala Cynwyd, PA 19004

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

PONTIFAX GLOBAL FOOD AND AGRICULTURE TECHNOLOGY FUND, L.P.

By: Pontifax Global Food and Agriculture Technology GP LLC
Its: General Partner

By: Adrenalin Properties Limited
Its: Managing Member

By: /s/ Ben Belldegrun
Name: Ben Belldegrun
Title: Managing Member

Address:
2025 S. Westgate Avenue, First Floor
Los Angeles, CA 90025

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

RA CAPITAL HEALTHCARE FUND, L.P.

By: RA Capital Management, LLC
Its: General Partner

By: /s/ Rajeev Shah
Name: Rajeev Shah
Title: Authorized Signatory

Address:
20 Park Plaza, Suite 1200
Boston, MA 02116
Attn: Compliance

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

REV CAPITAL II, LLC

By: /s/ Eric I. Richman
Name: Eric I. Richman
Title:

Address:
9740 Sorrel Avenue
Potomac, MD 20854

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

RFS PARTNERS, LP

By: RFS & Associates, LLC
Its: General Partner

By: /s/ Raymond F. Schinazi
Name: Raymond F. Schinazi
Title: Manager

Address:
1860 Montreal Road
Tucker, GA 30084
Attn: Bill Ollinger

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

RIDGEBACK CAPITAL INVESTMENTS LP

By: Ridgeback Capital Management LP
Its: Investment Manager

By: /s/ Christopher A. Nonas
Name: Christopher A. Nonas
Title: Chief Financial Officer

Address:
Ridgeback Capital Management LP
75 Ninth Ave., 5th Floor
New York, NY 10011

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

TODDMAN PTY LTD (ATF MH JORGENSEN FAMILY TRUST)

By: /s/ Max Jorgensen
Name: Max Jorgensen
Title:

Address:
Unit 1411/22 Refinery Parade
New Farm, Queensland 4005
Australia
Attn: Todd Jorgensen

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

VENBIO GLOBAL STRATEGIC FUND, L.P.

By: venBio Global Strategic GP, L.P.
Its: General Partner

By: venBio Global Strategic GP, Ltd.
Its: General Partner

By: /s/ Robert Adelman
Name: Robert Adelman
Title: Director

Address:
venBio Partners LLC
1700 Owens Street, Suite 595
San Francisco, CA 94158

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

INVESTOR:

VIVO PANDA FUND, L.P.

By: Vivo Panda, LLC
Its: General Partner

By: /s/ Mahendra Shah
Name: Mahendra Shah
Title: Managing Member

Address:
505 Hamilton Avenue, Suite 207
Palo Alto, CA 94301

SCHEDULE A

SCHEDULE OF INVESTORS

Name and Address	Number of Series A Shares Purchased	Number of Series B Shares Purchased
Adage Capital Partners, LP 200 Clarendon Street, 52nd Floor Boston, MA 02116 [***] [***] [***]	0	1,497,006
Agent Capital Fund I LP 810 Memorial Drive, Suite 107 Cambridge, MA 02139 [***] [***]	0	399,202
Alexandria Venture Investments, LLC 385 E. Colorado Blvd., Suite 299 Pasadena, CA 91101 [***] [***]	0	598,803
Amgen Investments Ltd. c/o Amgen Inc. One Amgen Center Drive Thousand Oaks, CA 91320 Attn: Corporate Secretary [***] [***] [***]	3,000,000	0
Amgen Ventures LLC c/o Amgen Inc. One Amgen Center Drive Thousand Oaks, CA 91320 Attn: Corporate Secretary [***] [***] [***]	0	499,002
ArrowMark Fundamental Opportunity Fund, L.P. ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	200,000

Name and Address	Number of Series A Shares Purchased	Number of Series B Shares Purchased
ArrowMark Life Science Fund ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	244,572
Baxalta US Inc. One Baxter Parkway Deerfield, IL 60015	2,000,000	0
Brace Pharmaceuticals LLC 155 Gibbs Street, Suite 406 Rockville, MD 20850 [***] [***] [***]	0	1,996,008
CF Ascent LLC ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	10,000
CHI EF II LP c/o Cowen Advisors, LLC 599 Lexington Avenue, 19th Floor New York, NY 10022 Attention: Tim Anderson [***]	0	135,805
Cormorant Global Healthcare Master Fund, LP 200 Clarendon Street, 5nd Floor Boston, MA 02116 [***] [***]	0	223,653
Cormorant Private Healthcare Fund I, LP 200 Clarendon Street, 5nd Floor Boston, MA 02116 [***] [***]	0	739,720

Name and Address	Number of Series A Shares Purchased	Number of Series B Shares Purchased
Cowen Healthcare Investment II LP c/o Cowen Advisors, LLC 599 Lexington Avenue, 19th Floor New York, NY 10022 Attention: Tim Anderson [***]	0	1,860,203
CRMA SPV, L.P. P.O. Box 309 Ugland House Grand Cayman KY1-11004 Cayman Islands [***] [***]	0	34,631
F-Prime Capital Partners Healthcare Fund IV LP c/o Fidelity Biosciences 1 Main Street, 13th Floor Cambridge, MA 02142 Attn: Mary Bevelock Pendergast [***] [***] [***] [***] [***]	7,000,000	873,253
Franklin Strategic Series – Franklin Biotechnology Discovery Fund Attention: Wendy Lam One Franklin Parkway San Mateo, CA 94403 [***] [***] [***]	0	750,193
Franklin Templeton Investment Funds – Franklin Biotechnology Discovery Fund Attention: Wendy Lam One Franklin Parkway San Mateo, CA 94403 [***] [***] [***]	0	1,245,815

Name and Address	Number of Series A Shares Purchased	Number of Series B Shares Purchased
G ERP LLC c/o DUMAC, Inc. 280 South Mangum Street, Suite 210 Durham, NC 27701-3675 [***] [***] [***] [***] [***]	45,995	15,607
G HSP LLC c/o DUMAC, Inc. 280 South Mangum Street, Suite 210 Durham, NC 27701-3675 [***] [***] [***] [***] [***]	61,493	20,866
G JBD LLC c/o DUMAC, Inc. 280 South Mangum Street, Suite 210 Durham, NC 27701-3675 [***] [***] [***] [***] [***]	105,507	35,801
G LTP LLC c/o DUMAC, Inc. 280 South Mangum Street, Suite 210 Durham, NC 27701-3675 [***] [***] [***] [***] [***]	287,005	97,387
Gilead Sciences, Inc. 333 Lakeside Drive Foster City, CA 94404 Attn: Andrew Dickinson, SVP, Corporate Dev. With copy to: Gilead Sciences, Inc. 333 Lakeside Drive Foster City, CA 94404 Attn: General Counsel [***] [***] [***] [***]	0	998,004

Name and Address	Number of Series A Shares Purchased	Number of Series B Shares Purchased
Iron Horse Investments, LLC ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	149,451
Leerink Holdings LLC One Federal Street, 37th Floor Boston, MA 02110 Attn: General Counsel [***] [***] [***] [***] [***] [***]	0	149,701
Leerink Partners Co-Investment Fund, LLC One Federal Street, 37th Floor Boston, MA 02110 Attn: General Counsel [***] [***] [***] [***] [***] [***]	0	149,701
Longevity Fund 1 LP 555 Bryant Street, #517 Palo Alto, CA 94301 Attn: Laura Deming [***]	150,000	49,900
Longevity Fund 2 LP 555 Bryant Street, #517 Palo Alto, CA 94301 Attn: Laura Deming [***]	0	49,900
Lookfar Investments, LLC ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	39,920

Name and Address	Number of Series A Shares Purchased	Number of Series B Shares Purchased
Meridian Growth Fund ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	624,759
Meridian Small Cap Growth Fund ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	558,855
Robert Millman 404 Beacon Street, #4 Boston, MA 02115 [***]	0	49,900
OCV Fund I, L.P. 4700 Wilshire Blvd. Los Angeles, CA 90010 Attn: Mark Yung [***] [***] [***]	0	2,360,289
Osage University Partners II, LP 50 Monument Road, Suite 201 Bala Cynwyd, PA 19004 [***] [***] [***]	2,000,000	399,202
Pontifax Global Food and Agriculture Technology Fund, L.P. 2025 S. Westgate Avenue, First Floor Los Angeles, CA 90025 Attn: Ben Belldegrun [***] [***] [***]	0	1,996,008
RA Capital Healthcare Fund, L.P. c/o RA Capital Management, LLC 20 Park Plaza, Suite 1200 Boston, MA 02116 Attn: Compliance [***] [***] [***]	3,000,000	399,202

Name and Address	Number of Series A Shares Purchased	Number of Series B Shares Purchased
REV Capital II, LLC Attn: Erick I. Richman 9740 Sorrel Avenue Potomac, MD 20854 [***]	0	99,800
RFS Partners, LP Attn: Bill Ollinger 1860 Montreal Road Tucker, GA 30084 [***] [***]	0	119,761
Ridgeback Capital Investments LP Attn: Ridgeback Capital Management LP 75 Ninth Avenue, 5th Floor New York, NY 10011 [***]	0	499,002
THB Iron Rose, LLC Life Science Portfolio ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	9,500
THB Iron Rose, LLC ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***] [***] [***] [***]	0	149,451
Toddman Pty Ltd (ATF MH Jorgensen Family Trust) Unit 1411/22 Refinery Parade New Farm, Queensland 4005 Australia Attn: Todd Jorgensen [***]	0	19,955
venBio Global Strategic Fund L.P. venBio Partners LLC 1700 Owens Street, Suite 595 San Francisco, CA 94158 Attn: Robert Adelman [***] [***]	8,000,000	998,004

Name and Address	Number of Series A Shares Purchased	Number of Series B Shares Purchased
Vivo Panda Fund, L.P. Vivo Capital 505 Hamilton Avenue, Suite 207 Palo Alto, CA 94301 [***] [***] [***]	0	598,803
Tony Yao ArrowMark Partners 100 Fillmore Street, Suite 325 Denver, CO 80206 [***]	0	9,500
TOTAL	**25,650,000**	**21,956,095**

SCHEDULE B

SCHEDULE OF COMMON HOLDERS

Name	Shares of Common Stock	Options
Derek Jantz	8,208,231	738,888
Matthew Kane	3,847,616	738,888
Jeff Smith	8,208,231	738,888

LICENSE AGREEMENT

THIS AGREEMENT made and entered into this 17th day of April ("EFFECTIVE DATE"), by and between DUKE UNIVERSITY, a nonprofit educational and research institution organized under the laws of North Carolina ("DUKE"), having its principal office at Durham, North Carolina 27710, and Precision BioSciences, Inc., a Delaware corporation ("PRECISION") with offices at 2211 Hillsborough Road, #4087, Durham, NC 27705.

WHEREAS, DUKE owns certain PATENT RIGHTS (as hereinafter defined) relating to Duke Office of Science and Technology File [***], entitled "[***]" ("INVENTION"), and has the right to grant licenses under said PATENT RIGHTS; and

WHEREAS, DUKE desires to have the PATENT RIGHTS developed and commercialized to benefit the public and is willing to grant a license hereunder; and

WHEREAS, LICENSEE desires to obtain licenses under PATENT RIGHTS and upon the terms and conditions hereinafter set forth; and

WHEREAS, the INVENTION was made with US government support and, notwithstanding anything to the contrary in this AGREEMENT, the US government has certain rights in the INVENTION under the 37 C.F.R. § 401.

NOW THEREFORE, in consideration of the premises and the mutual covenants contained herein, the parties hereto agree as follows:

ARTICLE 1 - DEFINITIONS

For the purposes of this AGREEMENT, and solely for that purpose, the terms and phrases set forth below and elsewhere in this AGREEMENT in capital letters shall be defined as follows:

1.01 "AFFILIATE" shall mean any corporation or non-corporate entity which controls, is controlled by or is under the common control with a party hereto. A corporation or a non-corporate entity, as applicable, shall be regarded as in control of another corporation if it owns or directly or indirectly controls at least fifty percent (50%) of the voting stock of the other corporation, or in the absence of ownership of at least fifty percent (50%) of the voting stock of a corporation, or in the case of a non-corporate entity, if it possesses directly or indirectly, the power to direct or cause the direction of the management and policies of such corporation or non-cooperate entity, as applicable.

1.02 "FIELD OF USE" shall mean all applications of the PATENT RIGHTS in all fields of use.

1.03 "INVENTOR" means any individual who is identified as an inventor on one or more of the PATENT RIGHTS (in accordance with applicable patent law) and whose contribution as an inventor to such PATENT RIGHTS was made as result of his/her association with DUKE such that the individual is obligated to assign his/her rights in such PATENT RIGHTS to DUKE.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

1.04 “PATENT RIGHTS” shall mean the patents, patent applications listed in APPENDIX A (such patent applications hereinafter collectively referred to as “PATENT APPLICATION”) and any patent hereafter issuing on any such PATENT APPLICATIONS, together with all divisions, continuations, continuations-in-part (but only to the extent that the subject matter claimed in each such continuation-in-part application is described in and enabled by the disclosure of said PATENT APPLICATIONS), re-examinations, reissues, substitutions, or extensions thereof and patents issuing therefrom in the United States and non-U.S. jurisdictions. Notwithstanding the foregoing or anything else to the contrary in this AGREEMENT, PATENT RIGHTS shall not include those patents and/or patent applications which, during the term of this AGREEMENT, cease to be PATENT RIGHTS pursuant to Section 6.01. It is understood and agreed that subject matter that is PATENTABLY DISTINCT (defined below) from the subject matter described within the PATENT APPLICATIONS is not within the scope of the PATENT RIGHTS even though that PATENTABLY DISTINCT subject matter may fall within the scope of one or more claims of said PATENT APPLICATIONS. PATENTABLY DISTINCT improvements relating to the subject matter of PATENT APPLICATIONS shall not be considered PATENT RIGHTS. As used herein, “PATENTABLY DISTINCT” subject matter is subject matter that is novel and unobvious over subject matter described within said PATENT APPLICATIONS.

1.05 “PATENT RIGHTS EXPENSES” shall mean all patent-related expenses (including, but not limited to, filing fees, maintenance fees, and reasonable fees and expenses of patent counsel) incurred in connection with the PATENT RIGHTS, including but not limited to all reasonable expenses incurred in connection with the assembly and copying of files for transfer to and from as the case may be LICENSEE’s legal counsel in connection with LICENSEE’s assuming responsibility for PATENT RIGHTS or transferring some of all of that responsibility back to DUKE (as the case may be) pursuant to Section 6.

1.06 “VALID CLAIM” shall mean (i) an issued and unexpired claim within the PATENT RIGHTS, that has not been permanently revoked or held invalid or unenforceable by a decision of a court or other governmental agency of competent jurisdiction and that has not been dedicated to the public or admitted to be invalid or unenforceable through reissue, disclaimer or otherwise, or (ii) a claim of a pending patent application that was filed in good faith, has not been pending for more than [***] (including in parent applications), and which has not been abandoned or finally disallowed without the possibility of appeal or refilling of such application contained in the PATENT RIGHTS in the country in which any such product or part thereof is made, used or sold.

1.07 “LICENSED PRODUCT” shall mean any product or part thereof which:

(a) is covered in whole or in part by any VALID CLAIM contained in the PATENT RIGHTS in the country in which any such product or part thereof is made, used or sold; and/or

(b) is manufactured by using a process which is covered in whole or in part by a VALID CLAIM contained in the PATENT RIGHTS in the country in which such product or part thereof is used or sold; or

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[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

(c) in its use, practices a VALID CLAIM contained in the PATENT RIGHTS in the country in which any such product or part thereof is made, used, or sold.

1.08 “LICENSED PROCESS” shall mean any process which is covered in whole or in part by any VALID CLAIM contained in the PATENT RIGHTS.

1.09 “LICENSED PRODUCTS” shall mean the following terms, collectively: LICENSED PRODUCTS, LICENSED PROCESSES, and LICENSED SERVICES, and a LICENSED PROCESS and LICENSED SERVICE shall be included within such term notwithstanding such process or service is not literally a “product”.

1.10 “LICENSED SERVICE” shall mean any service provided by LICENSEE (and/or SUBLICENSEES, as the case may be) to a THIRD PARTY that is covered in whole or in part by any VALID CLAIM contained in the PATENT RIGHTS.

1.11 “MATERIALS” shall mean samples of the materials covered under Patent Rights.

1.12 “NET SALES” shall mean:

(a) in the case of LICENSED PRODUCTS, LICENSEE’S (and/or those of its AFFILIATES, as the case may be) revenues received from sale and/or lease of LICENSED PRODUCTS; and

(b) in the case of LICENSED PROCESSES, LICENSEE’S (and/or those of its AFFILIATES, as the case may be) revenues received from sale and/or lease of LICENSED PROCESSES; and

[***]:

[***]
[***]
[***]
[***]

[***]

1.13 “SUBLICENSE” and “SUBLICENSE AGREEMENT” shall mean, and include without limitation, any relationship/agreement in which a THIRD PARTY gains any rights—temporary or otherwise—to any of the rights granted by DUKE to LICENSEE under this AGREEMENT (including, but not limited to, LICENSEE’s licensee(s) and/or sublicensee(s), hereinafter, such THIRD PARTIES referred as “SUBLICENSEES”, but not including LICENSEE’s AFFILIATES), including, but not limited to those granted via options, rights of first refusal, material transfer agreements, sublicenses (implied or expressed), and the like.

1.14 “SUBLICENSE REVENUES” shall mean any and all upfront fees, license fees, royalties, option fees, milestone payments, and other amounts payable to LICENSEE (and/or its AFFILIATES, as the case may be) under a SUBLICENSE to any of the licenses granted by DUKE to LICENSEE under this AGREEMENT, [***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

1.15 “TERRITORY” shall mean the world.

1.16 “THIRD PARTY” means any individual or other entity other than DUKE and/or LICENSEE or its AFFILIATES.

1.17 Where appropriate, words denoting a singular number only shall include the plural and vice versa.

1.18 Certain other defined terms shall have the meanings given them elsewhere in this AGREEMENT.

ARTICLE 2 - LICENSE

2.01 DUKE hereby grants to LICENSEE and its AFFILIATES and LICENSEE and its AFFILIATES hereby accept from DUKE, subject to the terms and conditions of this AGREEMENT, the exclusive right and sublicenseable license for the FIELD OF USE in the TERRITORY to practice under the PATENT RIGHTS (a) to develop, make, have made, import, use, lease, offer for sale, sell, and distribute LICENSED PRODUCTS for the FIELD OF USE in the TERRITORY, (b) to develop, make, have made, import, use, practice, lease, offer for sale, sell, and distribute LICENSED PROCESSES in/for the FIELD OF USE in the TERRITORY, until the end of the term for which the PATENT RIGHTS are granted unless this AGREEMENT shall be sooner terminated according to the terms hereinafter provided.

2.02 Notwithstanding anything to the contrary in this AGREEMENT, it is understood and agreed that DUKE encourages LICENSEE (and/or its AFFILLIATES and/or SUBLICENSEE(S), as the case may be) to secure rights under any THIRD PARTY intellectual property rights required to practice the PATENT RIGHTS and/or to exercise any and all of the rights practiced or exercised by LICENSEE or such AFFILIATES and/or SUBLICENSEE(S) (as the case may be) and that DUKE shall have no responsibility in securing any such rights. Further, if LICENSEE (and/or any of its AFFILIATES) secures any such rights to THIRD PARTY intellectual property rights in order to practice the technology and/or to exercise any or all the rights granted herein, then LICENSEE (and/or such AFFILIATES and/or SUBLICENSEE, as the case may be) shall use its commercially reasonable efforts to secure from any such THIRD PARTY a covenant not to sue DUKE, or any of its faculty, students, employees or agents, for any research and development efforts conducted at DUKE that resulted in the creation of any of its inventions and/or any licensing thereof, and any intellectual property or other rights arising therefrom, including, but not limited to, PATENT RIGHTS.

2.03 All SUBLICENSES shall be subject to the terms and conditions of this AGREEMENT, shall be no less favorable to or protective of DUKE than this AGREEMENT except as expressly stated in this AGREEMENT, and shall not be further sublicenseable without the express written approval of DUKE, such approval not to be unreasonably withheld. DUKE shall be a third party beneficiary of each SUBLICENSE. In the event of any termination of this Agreement, all SUBLICENSES shall survive such termination provided that the SUBLICENSEES are in compliance with the terms and conditions of the SUBLICENSE and the SUBLICENSEES comply with all terms of this Agreement related to such SUBLICENSE including the payment of all amounts that would be due DUKE under this Agreement if it had not terminated. In such case,

DUKE shall not be obligated to perform any of the obligations of LICENSEE under such SUBLICENSE. However, DUKE shall have all of the rights afforded LICENSEE under any such SUBLICENSE including but not limited to enforcement of the SUBLICENSE, collection of payments, receipt of reports indemnification by SUBLICENSEE, termination for breach by SUBLICENSEE etc. LICENSEE will ensure that said rights to DUKE are included in any executed SUBLICENSE. LICENSEE shall use commercially reasonable efforts to enforce the terms of the SUBLICENSE agreements. LICENSEE further agrees to provide DUKE with a copy of all SUBLICENSES [***] prior to execution of each subject SUBLICENSE with the ability to review and comment, such comments to be reasonably considered by LICENSEE. LICENSEE will provide DUKE with an executed copy of SUBLICENSE within [***] of the effective date of such SUBLICENSE.

2.04 In the event that LICENSEE shall receive non-cash consideration for any SUBLICENSE, DUKE shall nonetheless be entitled to its applicable portion of sublicense fees in cash with respect to such non-cash consideration. In the event that DUKE and LICENSEE cannot agree on the value of such on-cash consideration, such value shall be determined by an independent THIRD PARTY selected in good faith by LICENSEE and DUKE. If LICENSEE and DUKE cannot mutually agree upon an independent THIRD PARTY within thirty (30) business days, then DUKE and LICENSEE shall each select an independent THIRD PARTY within thirty (30) business days, and those two independent third parties shall in good faith select a mutually agreeable THIRD PARTY within thirty (30) days thereafter. The expense of such independent THIRD PARTY being borne equally by DUKE and LICENSEE. In the event on a dispute concerning the valuation of the THIRD PARTY consideration, no payment of the fees with respect thereto shall be made until the dispute is resolved.

[***]

2.06 Notwithstanding anything to the contrary in this AGREEMENT, DUKE shall have the right to practice under the PATENT RIGHTS for its own internal, non-commercial, educational, research and clinical purposes without restriction and without payment of royalties and other fees.

2.07 The licenses granted under this AGREEMENT will not be construed to confer any rights upon LICENSEE by implication, estoppel or otherwise as to any data, technology, patents, patent applications or other property rights held by DUKE (solely or jointly) not specifically set forth herein, regardless of whether such property rights are dominant or subordinate to any of the PATENT RIGHTS DUKE represents that it is the sole owner of the Patent Rights, that it has the authority to grant the licenses granted hereunder, and that it has not knowingly taken any actions that would adversely affect the validity of the PATENT RIGHTS. DUKE does not warrant the validity or enforcement of the PATENT RIGHTS licensed hereunder and makes no representations whatsoever with regard to the scope of the PATENT RIGHTS or that the practice of the PATENT RIGHTS does not infringe the rights of any third party. Notwithstanding anything to the contrary in this Section 2, LICENSEE shall have the right to continue to use the lab notebooks and technical data related to the PATENT RIGHTS developed by employees or agents of LICENSEE while working at DUKE, provided however, that DUKE employees and students shall not be considered agents of LICENSEE.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

2.08 DUKE hereby discloses to LICENSEE and LICENSEE acknowledges that the research leading to the PATENT RIGHTS was funded in part by the U.S. Government, and the parties agree that, notwithstanding any use of descriptive terms such as “exclusive” herein this AGREEMENT, the U.S. Government has certain rights in the PATENT RIGHTS as set forth in 37 CFR 401. LICENSEE agrees to comply with all obligations resulting from such government rights, including, but not limited to, the requirement that any products sold in the United States based upon such technology be substantially manufactured in the United States.

2.09 The license granted hereunder shall be subject to Public Law 96-517 and Public Law 98-260. Any right granted in this AGREEMENT which is greater than that permitted under Public Law 96-517 and Public Law 98-260 shall be modified as may be required to conform to the provisions of those laws.

ARTICLE 3 - LICENSE FEE, ROYALTIES AND OTHER FEES

3.01 In consideration of the rights granted to LICENSEE pursuant to this AGREEMENT and subject to the terms and conditions of this AGREEMENT, LICENSEE agrees to pay or otherwise compensate DUKE as follows:

(a) [***]

(b) LICENSEE shall pay to DUKE [***], which shall be due and payable within [***] of the EFFECTIVE DATE.

(c) Royalty on NET SALES. At the times and in the manner set forth hereinafter, LICENSEE and it AFFILIATES shall pay to DUKE a [***] royalty on NET SALES of LICENSED PRODUCTS or LICENSED PROCESSES, by LICENSEE, and/or its AFFILIATES. Such royalty shall be at the rate of:

(i) [***] of NET SALES for LICENSED PRODUCTS; and

(ii) [***] of NET SALES for LICENSED PROCESSES; and

provided that where in order to manufacture, sell, use, practice or otherwise dispose of LICENSED PRODUCTS or LICENSED PROCESSES it is [***] for LICENSEE to obtain a license under any patent rights from a THIRD PARTY (including in settlement of a claim contemplated by Article 7.01) and by reason of an agreement with such THIRD PARTY a royalty on LICENSEE NET SALES (or similarly defined amount) is payable to such THIRD PARTY the royalties shall be reduced as follows. The royalty payable pursuant to this Article 3.01(c) shall be reduced by [***] of the amounts paid to third parties provided that under no circumstances will the royalty payable to DUKE on NET SALES of LICENSED PRODUCTS or LICENSED PROCESSES reduce to less than [***].

(d) MINIMUM ROYALTY. [***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

(i) [***]

(ii) [***]

[***]

(e) SUBLICENSE FEE. LICENSEE shall pay to DUKE a sublicense fee ("SUBLICENSE FEE") which is equal to:

(i) [***] of all SUBLICENSE REVENUES from royalties; plus,

(ii) [***] of all SUBLICENSE REVENUES from non-royalty sublicense revenue.

SUBLICENSE FEES shall be creditable against the MINIMUM ROYALTIES on NET SALES in Section 3.01(d).

(f) MILESTONE PAYMENTS. LICENSEE shall pay to DUKE, MILESTONE PAYMENTS as set forth in APPENDIX C.

3.02 Notwithstanding reports, correspondence or other communications from LICENSEE, it is understood that DUKE shall, in accordance with its policies and procedures, apply any amounts received from LICENSEE under the terms of this AGREEMENT as follows:

(a) [***]

(b) [***]

Application of amounts received under (a) above shall in no respect alter the aggregate amount due to DUKE.

3.03 Notwithstanding anything to the contrary in this AGREEMENT, all payments due hereunder shall be paid in full, without deduction of taxes or other fees which may be imposed by any government and which shall be paid by LICENSEE on behalf of LICENSEE, as the case may be.

3.04 LICENSEE agrees to achieve the milestones set forth in APPENDIX B. If these milestones are not met, DUKE may, in its sole discretion after providing LICENSEE a thirty (30) day notification during which period LICENSEE fails to achieve the applicable milestone(s), terminate the exclusive licenses granted hereunder. In the event of any such termination, all SUBLICENSES shall survive such termination provided that the SUBLICENSEES are in compliance with the terms and conditions of the SUBLICENSE and the SUBLICENSEES comply with all terms of this Agreement related to such SUBLICENSE including the payment of all amounts that would be due DUKE under this Agreement if it had not terminated. In such case, DUKE shall not be obligated to perform any of the obligations of LICENSEE under such SUBLICENSE subject to the same terms and conditions as described in section 2.03. For any rights that LICENSEE may be permitted to retain, LICENSEE will still be responsible to DUKE for any royalty payments and payments with respect to non-royalty income.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

3.05 All payments due from LICENSEE pursuant to this AGREEMENT shall be due and payable in accordance with the terms and conditions of this AGREEMENT, and if a payment due pursuant to this AGREEMENT is not paid within [***] of the payment due date, then a late payment fee equal to [***] shall be added to the payment due; [***]. The payment of such [***] late fees shall not foreclose DUKE from exercising any other rights it may have as a consequence of the lateness of any payment.

3.06 No multiple royalties on NET SALES shall be payable to DUKE on a single LICENSED PRODUCT or LICENSED PROCESS, because its manufacture, use, lease, sale or practice are or shall be covered by more than one of the PATENT RIGHTS.

3.07 All payments due to DUKE under this AGREEMENT shall be paid in United States Dollars in Durham, North Carolina, or at such place as DUKE may reasonably designate consistent with the laws and regulations controlling in any foreign country. If any currency conversion shall be required in connection with such payments due hereunder, such conversion shall be made by using the exchange rate prevailing at Wachovia Bank (N.A.) (or its successor, as the case may be) on the last business day of the reporting period to which such payments relate. If payments are made by wire, electronic or other transfer form for which a fee is charged ("PAYMENT TRANSFER FEES"), LICENSEE shall be responsible for the full amount of such fees and shall promptly reimburse DUKE for DUKE's payment of such reasonable PAYMENT TRANSFER FEES within thirty (30) days of invoice of the same from DUKE.

3.08 All payments due to DUKE under this AGREEMENT shall cite "[***]", and shall be made payable to "Duke University." Such payments, as well as reports due to DUKE shall be sent to DUKE at the following address:

For delivery via the U.S. Postal Service:

Duke University Office of Science and Technology
Attention: Financial Administrator
Box 90083 Duke University
Durham, NC 27708 USA

For delivery via nationally/internationally recognized courier:

Duke University Office of Science and Technology
Attention: Financial Administrator
2020 West Main Street, Suite 10
Durham, NC 27705 USA

For payment via wire transfer:

BANK:	[***]
	[***]
ABA#	[***]
SWIFT CODE:	[***]
BENEFICIARY:	[***]
ACCOUNT NO.:	[***]
ATTENTION:	[***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

ARTICLE 4 - DUE DILIGENCE REQUIREMENTS

4.01 LICENSEE shall use commercially reasonable efforts to bring LICENSED PRODUCTS and/or LICENSED PROCESSES to market through a thorough, vigorous and diligent program for exploitation of the PATENT RIGHTS, and to continue active, diligent marketing efforts for LICENSED PRODUCTS and/or LICENSED PROCESSES throughout the term of this AGREEMENT. The development and commercialization schedule set forth on attached APPENDIX B (hereinafter "COMMERCIALIZATION SCHEDULE") is hereby agreed upon as a reasonable one to be followed. Variations from the schedule set forth in the COMMERCIALIZATION SCHEDULE must be expressly approved by DUKE in writing, such approval not to be unreasonably withheld. If any of the targets set forth in the COMMERCIALIZATION SCHEDULE are not reached within the stated time periods set out in APPENDIX B, or within those amended periods of time approved in writing by Duke, then it will be considered a material breach by the LICENSEE, and will be handled according to Section 10 herein.

4.02 During the term of this AGREEMENT, LICENSEE will submit [***] progress reports to DUKE as set forth in Section 5. DUKE shall have the right to request [***] to discuss such information with representatives of LICENSEE at mutually acceptable times and places. It is agreed that should any of DUKE's personnel be required by LICENSEE to consult with LICENSEE outside of Durham, North Carolina, LICENSEE will reimburse reasonable travel and living expenses incident thereto.

ARTICLE 5 - REPORTS AND RECORDS

5.01 LICENSEE shall keep full, true and accurate books of accounts and other records containing all particulars which may be necessary to properly ascertain and verify the amounts payable to DUKE hereunder and shall require its AFFILIATES and/or SUBLICENSEES, as the case may be, to do the same. Said books of account shall be kept at LICENSEE's (and/or AFFILIATE's and/or SUBLICENSEES') principal place of business or the principal place of business of the appropriate division of LICENSEE (and/or AFFILIATE's and/or SUBLICENSEE) to which this AGREEMENT relates. Said books of LICENSEE and its AFFILIATES and the supporting data shall be open at all reasonable times for [***] following the end of the calendar year to which they pertain, to the inspection of an independent certified public accountant engaged by DUKE for the purpose of verifying the LICENSEE's and/or AFFILIATE'S royalty statement or compliance in other respects with this AGREEMENT. [***]

5.02 LICENSEE shall report the status of development of each LICENSED PRODUCT and LICENSED PROCESS [***] to DUKE by [***]. Such report shall provide information at least sufficient to meet DUKE's government reporting requirements and additionally shall include descriptions of LICENSEE's (and/or AFFILIATE's and/or SUBLICENSEES's plans and commercially reasonable estimated timeframes for testing, development, governmental approvals and marketing/sale of each LICENSED PRODUCT or LICENSED PROCESS.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

5.03 After the first commercial sale of a LICENSED PRODUCT or LICENSED PROCESS and in addition to the reports required, LICENSEE shall render to DUKE prior to [***] a written account of the NET SALES of LICENSED PRODUCTS and LICENSED PROCESSES, subject to royalty under this AGREEMENT and made during the prior [***] period ending [***], and shall simultaneously pay to DUKE the royalties due on such NET SALES in United States dollars. Reports tendered shall include the calculation of royalties by product by country in substantially the format provided in APPENDIX D hereto. Further, LICENSEE shall render to DUKE prior to [***] a written account of the portion of SUBLICENSE REVENUES due to DUKE for the prior [***] period [***] and shall simultaneously pay to DUKE such amounts due in United States dollars. MINIMUM ROYALTIES which are due DUKE for any calendar year, shall be paid by LICENSEE along with the written report due on [***].

ARTICLE 6 - PATENTS

6.01 Patent Prosecution

(a) LICENSEE shall, apply for, prosecute, and maintain the PATENT RIGHTS during the term of this AGREEMENT. LICENSEE will keep DUKE advised as to all developments with respect to any PATENT APPLICATIONS, and/or applicable continuation, continuation-in-part and reissue application(s) promptly. DUKE will have (i) the right to review LICENSEE's pending PATENT APPLICATIONS that are within the PATENT RIGHTS, and to make recommendations regarding the prosecution of such PATENT APPLICATIONS, (ii) the right to receive such applications and other documentations at such time as to allow a reasonable period for review thereof prior to any applicable deadline for filing or responding, and (iii) the right to request amendments of any such patent application to include claims or arguments as may be appropriate for obtaining a patent claiming commercially relevant inventions. Upon request by DUKE and/or its agents, LICENSEE shall promptly inform DUKE in writing which non-US countries, if any, in which LICENSEE will seek patent protection. DUKE may elect to seek patent protection in countries not so designated by LICENSEE, in which case DUKE shall notify LICENSEE in writing of such election, and from the date of such filing of such PATENT APPLICATIONS by DUKE shall not be considered PATENT RIGHTS (and/or PATENT APPLICATIONS) and LICENSEE shall be deemed to have forfeited all rights under this AGREEMENT to such PATENT APPLICATIONS and resulting patents. (APPENDIX A shall be deemed to be so amended.) It is understood and agreed that all final decisions with respect to prosecution of PATENT RIGHTS are reserved to DUKE except as expressly stated in this AGREEMENT.

6.02 Patent Costs.

(a) [***]

(b) If LICENSEE decides to discontinue the prosecution or maintenance of a subject PATENT APPLICATION or patent falling within the scope of PATENT RIGHTS, LICENSEE will give DUKE timely written notice at least [***] in advance of the effective date of LICENSEE's decision and DUKE will be free to continue prosecution or maintain any such application/patent, and to maintain any protection issuing thereon in the U.S. and in any foreign country at DUKE's sole expense. In such instances, from the date of DUKE's receipt of such

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written notice from LICENSEE, such patent and/or PATENT APPLICATION shall no longer be considered to fall within the definition of PATENT RIGHTS (APPENDIX A shall be deemed to be so amended) and LICENSEE shall forfeit all rights under this AGREEMENT to the subject issued patent(s) and/or subject PATENT APPLICATION and patent(s) arising from such PATENT APPLICATION. Accordingly, DUKE shall be free, at its sole discretion to license said patent(s) and patent application(s) to any THIRD PARTY or otherwise dispose of such patent(s) and patent applications(s) as it deems appropriate.

6.03 It is understood that ownership of such PATENT RIGHTS shall not be affected by LICENSEE's assuming such responsibility for prosecution and maintenance of such PATENT RIGHTS.

6.04 LICENSEE agrees to mark the LICENSED PRODUCTS and LICENSED PROCESS, and/or their containers, labels, and/or other packaging, in such a manner as to conform to the patent laws and practices of the country of manufacture or sale, as appropriate.

ARTICLE 7 - INFRINGEMENT OF THIRD-PARTY RIGHTS

7.01 In the event that DUKE or LICENSEE is charged with infringement of a patent by a THIRD PARTY or is made a party in a civil action as a result of the activity of LICENSEE and/or its AFFILIATE and/or a SUBLICENSEE (and not from the activity of DUKE or its AFFILIATES other than the granting of this license to LICENSEE) as a result (directly or indirectly) under the licenses granted hereunder to LICENSEE, LICENSEE:

(a) [***];

(b) [***];

(c) [***].

7.02 DUKE will give LICENSEE reasonable assistance, [***] in the defense of any such infringement charge or lawsuit, as may be reasonably required. [***].

ARTICLE 8 - INFRINGEMENT OF PATENT RIGHTS BY THIRD PARTIES

8.01 Each party to this AGREEMENT is obligated to inform the other promptly in writing of any alleged infringement of which it becomes aware and of any available evidence of infringement by a THIRD PARTY of any patents within the PATENT RIGHTS.

8.02 If during the term of this AGREEMENT, LICENSEE becomes aware of any alleged infringement by a THIRD PARTY, LICENSEE shall have the right, but not the obligation, to either:

(a) settle the infringement suit by sublicensing the alleged infringer or by other means; or

(b) prosecute at its own expense any infringement of the PATENT RIGHTS. In the event LICENSEE prosecutes such infringement of PATENT RIGHTS, LICENSEE may, for such purposes, request to use the name of DUKE as party plaintiff. DUKE, at its sole discretion, may agree to become a party plaintiff, and all costs associated therewith shall be borne by LICENSEE.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

8.03 In the event that LICENSEE undertakes the enforcement and/or defense of the PATENT RIGHTS by litigation, including any declaratory judgment action, [***]. Any recovery of damages by LICENSEE as a result of such action shall be applied [***].

8.04 In the event LICENSEE does not undertake action to prevent the infringing activity within [***] of having been made aware and notified thereof, DUKE shall have the right, but not the obligation, to prosecute at its own expense any such infringements of the PATENT RIGHTS and, in furtherance of such right, DUKE may use the name of LICENSEE as a party plaintiff in any such suit without expense to LICENSEE. [***]. Any recovery of damages by DUKE for any infringement shall be applied [***].

8.05 In any infringement suit instituted by either party to enforce the PATENT RIGHTS pursuant to this AGREEMENT, the other party hereto shall, at the request and expense of the party initiating such suit, reasonably cooperate in all respects and, to the extent reasonably possible, have its employees testify when requested and make available relevant records, papers, information, samples, specimens, and the like.

8.06 LICENSEE has the sole right in accordance with the terms and conditions herein to sublicense any LICENSED PRODUCT or LICENSED PROCESS to an alleged infringer under the PATENT RIGHTS in the TERRITORY in order to avoid infringement in the future.

8.07 Any of the foregoing notwithstanding, if at any time during the term of this AGREEMENT any of the PATENT RIGHTS are held invalid or unenforceable in a decision which is not appealable or is not appealed within the time allowed, LICENSEE shall have no further obligations to DUKE with respect to its future use or sale of any LICENSED PRODUCT and LICENSED PROCESS covered solely by such PATENT RIGHTS, including the obligation of paying royalties. For avoidance of doubt it is understood and agreed that in such event, LICENSEE shall not have any damage claim or any claim for refund or reimbursement against DUKE for any amounts previously paid to DUKE under this AGREEMENT.

ARTICLE 9 - GOVERNMENT CLEARANCE, PUBLICATION, EXPORT

9.01 Insofar as such clearance is required, LICENSEE agrees to use its commercially reasonable efforts to have the LICENSED PRODUCTS and/or LICENSED PROCESSES cleared for marketing in those countries in which LICENSEE intends to sell LICENSED PRODUCTS and/or LICENSED PROCESSES, by the responsible government agencies requiring such clearance. To accomplish said clearances at the earliest possible date, LICENSEE agrees to file or have filed, according to the usual practice of LICENSEE, any necessary data with said government agencies as quickly as commercially reasonable.

9.02 It is understood and agreed that the right of publication/presentation of the inventions described in the PATENT RIGHTS shall reside in the INVENTORS, faculty, staff, and students of DUKE. LICENSEE shall also have the right to publish and/or co-author any publication/presentation on the inventions described in PATENT RIGHTS in accordance with academic custom.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

9.03 This AGREEMENT is subject to all of the United States laws and regulations controlling the export of technical data, computer software, laboratory prototypes and other commodities and technology. It is understood that DUKE is subject to United States laws and regulations controlling the export of technical data, computer software, laboratory prototypes and other commodities (including the Arms Export Control Act, as amended and the Export Administration Act of 1979), and that its obligations hereunder are contingent on compliance with applicable United States export laws and regulations. The transfer of certain technical data and commodities may require a license from the cognizant agency of the United States Government and/or written assurances by LICENSEE that LICENSEE shall not export data or commodities to certain foreign countries without prior approval of such agency. DUKE neither represents that a license shall not be required nor that, if required, it shall be issued.

ARTICLE 10 - DURATION AND TERMINATION

10.01 This AGREEMENT shall become effective upon the EFFECTIVE DATE, and unless sooner terminated in accordance with any of the provisions herein, shall remain in full force and effect for the life of the last-to-expire of the patents included in the PATENT RIGHTS.

10.02 Subject to the provisions of this AGREEMENT, LICENSEE will have caused a material breach in accordance with this Section 10 if LICENSEE fails to meet any of the development/commercialization milestones set forth in APPENDIX B unless DUKE expressly approves such variations in writing.

10.03 LICENSEE may terminate this AGREEMENT by giving DUKE written notice at least [***] prior to the effective date of such termination. It is understood that LICENSEE shall remain responsible for the timely payment of all amounts due DUKE under this AGREEMENT through the effective date of the termination.

10.04 Either party may immediately terminate this AGREEMENT for fraud, willful misconduct, or illegal conduct of the other party, in all such cases with respect to the subject matter of this AGREEMENT, upon written notice of same to that other party.

10.05 If either party fails to fulfill any of its material obligations under this AGREEMENT including, but not limited to, lack of payment or failure to meet the provisions of ARTICLE 3, the non-breaching party may terminate this AGREEMENT, upon written notice to the breaching party, as provided below. Such notice must contain a full description of the event or occurrence constituting a breach of the AGREEMENT. The party receiving notice of the breach will have the opportunity to cure that breach within [***] of receipt of notice. If the breach is not cured within that time, the termination will be effective as of [***].

10.06 If during the term of this AGREEMENT, LICENSEE shall become insolvent whether by the voluntary act of LICENSEE or otherwise, or if LICENSEE shall cease to exist as an active business, this AGREEMENT shall immediately terminate. In the event the LICENSEE shall become bankrupt or if the business of LICENSEE shall be placed in the hands of a receiver or trustee, this LICENSE shall terminate unless otherwise prohibited by law or judicial action.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

10.07 Notwithstanding anything to the contrary in this AGREEMENT, neither expiration nor any termination of this AGREEMENT shall remove any financial obligations to DUKE which LICENSEE incurred under this AGREEMENT prior to and as of the effective date of any expiration or termination.

10.08 On or before the effective date of any early termination of this AGREEMENT pursuant to Sections 10.02 – 10.06, LICENSEE shall cease the manufacture, use, practice, lease, and sale, offering, distribution, and other commercialization of LICENSED PRODUCTS and LICENSED PROCESSES.

10.09 Within [***] of any early termination of this AGREEMENT, LICENSEE shall destroy all LICENSED PRODUCTS for which a royalty has not been paid to DUKE in a safe and legal manner. LICENSEE shall also provide DUKE with a written statement signed by an authorized representative of LICENSEE certifying the destruction of all such LICENSED PRODUCTS for which a royalty has not been paid to DUKE in a safe and legal manner. Further, LICENSEE shall certify that they have destroyed all confidential information provided by DUKE under Article 11 or return all copies of such information to DUKE.

ARTICLE 11 - CONFIDENTIALITY

11.01 DUKE and LICENSEE each agree to treat any confidential information disclosed to it by the other party under this AGREEMENT with reasonable care and to avoid disclosure of such information to any other person, firm or corporation, except AFFILIATES bound by the obligations of confidentiality and restricted use set forth in this Article 11, and either party shall be liable for unauthorized disclosure or failure to exercise such reasonable care. Further, the receiving party will not use the disclosing party's confidential information other than for the benefit of the parties hereto and relating to this AGREEMENT. These obligations of non-disclosure and restricted use shall remain in effect for each subject disclosure of confidential information for a period of time of [***] from such disclosure, however, neither party shall have an obligation, with respect to confidential information disclosed to it, or any part thereof, which:

(a) is already known to the receiving party at the time of the disclosure;

(b) becomes publicly known without the wrongful act or breach of this AGREEMENT by the receiving party;

(c) is rightfully received by the receiving party from a THIRD PARTY on a non-confidential basis;

(d) is subsequently and independently developed by employees of the receiving party who had no knowledge of the information, as verified by written records;

(e) is approved for release by prior written authorization of the party disclosing the information; or

(f) is disclosed pursuant to any judicial or government request, requirement or order, provided that the party so disclosing takes reasonable steps to provide the other party sufficient prior notice in order to contest such request, requirement or order and provided that such disclosed confidential information otherwise remains subject to the obligations of confidentiality set forth in this Article 11.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

11.02 DUKE and LICENSEE agree that any information to be treated as confidential information under this Article 11 must be disclosed in writing or other tangible medium and must be clearly marked “CONFIDENTIAL”. Confidential information disclosed orally must be summarized and reduced to writing or other tangible medium and communicated to the other party within [***] of such disclosure, and the other party agrees that such disclosed information shall be deemed confidential.

11.03 Notwithstanding the foregoing, LICENSEE shall have the right to use and disclose any confidential information related to the PATENT RIGHTS (a) to the extent necessary to obtain regulatory approval for, or to sell, a LICENSED PRODUCT or LICENSED PROCESS and (b) to investors, prospective investors, employees, consultants and agents with a need to know, collaborators, prospective collaborators and other THIRD PARTIES in the chain of manufacturing and distribution provided that LICENSEE obtains from such parties written confidentiality agreements, the provisions of which are at least as restrictive and protective of DUKE’s confidential information as those provided in this Article 11.

11.04 Notwithstanding anything to the contrary in this AGREEMENT, all information relating to filing, prosecution, maintenance, defense, infringement, and the like regarding the PATENT RIGHTS (no matter how disclosed) shall be considered the confidential information of DUKE until published by the applicable patent office and subject to the obligations of restricted use and non-disclosure set forth in this Article 11.

ARTICLE 12 - NOTICES

12.01 It shall be a sufficient giving of any notice, request, report, statement, disclosure or other communication hereunder if the party giving the same shall

(a) hand deliver such communication; or

(b) mail such a communication, postage prepaid, first class, certified mail; or

(c) send such communication, shipping prepaid by national/international courier service

to the party to receive such communication at the address given below or as otherwise given as provided in this ARTICLE 12, in the case of payments and/or reports due in accordance with this AGREEMENT or such other address as may hereafter be designated by notice in writing by the appertaining party.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

DUKE	LICENSEE
For delivery via the U.S. Postal Service	
Office of Science and Technology Duke University Attn: Agreement Coordinator Box 90083 Durham, NC 27708 USA	Precision BioSciences, Inc. Attn: Matthew Kane 2211 Hillsborough Rd #4087 Durham, NC 27705 USA
For delivery via nationally/internationally recognized courier	
Office of Science and Technology Duke University Attn: Agreement Coordinator 2020 West Main Street, Suite 10 Durham, NC 27705 USA	(same as above)
cc: *(if of a legal nature)* Office of University Counsel Duke University 2400 Pratt Street, Suite 4000 Durham, North Carolina 27710	WilmerHale Attn: Michael J. Bevilacqua 60 State Street Boston, MA 02109 USA

12.02 The date of giving any such notice, request, report, statement, disclosure or other communications, and the date of making any payment hereunder required (provided such payment is received), shall be the actual date of receipt.

ARTICLE 13 - ASSIGNMENT

13.01 This AGREEMENT shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto. However, LICENSEE may not assign its rights in this AGREEMENT without approval by DUKE, such approval not to be unreasonably withheld. Notwithstanding the foregoing, a change of control transaction, merger, consolidation or sale of substantially all of the business of LICENSEE related to this Agreement shall not be deemed an assignment for purposes of this clause and no consent of DUKE shall be required for such transactions.

ARTICLE 14 - INDEMNITY, INSURANCE, REPRESENTATIONS, STATUS

14.01 DUKE, and its trustees, officers, employees, faculty members, students, and agents (collectively, “DUKE Indemnitees”) will be indemnified, defended by counsel reasonably acceptable to DUKE, and held harmless by LICENSEE and AFFILIATES and SUBLICENSEES, as the case may be, from and against any claim, liability, cost, expense, damage, deficiency, loss or obligation, of any kind or nature (including, without limitation, reasonable attorneys’ fees and other costs and expenses of defense) (collectively, “CLAIMS”) based upon, arising out of, or otherwise relating to this AGREEMENT including, but not limited to, (i) any action relating to product liability, and (ii) any CLAIM that a LICENSED PRODUCT and/or LICENSED PROCESS and/or practice of any of the PATENT RIGHTS infringes the intellectual property of a THIRD PARTY. However, the foregoing indemnity shall not apply to CLAIMS to the extent that they are (x) caused by the gross negligence of DUKE, DUKE employees, DUKE faculty members,

students, and/or agents acting solely within the performance of their respective responsibilities at DUKE, (y) caused by a material breach of this AGREEMENT by DUKE, and/or (z) pertain solely to claims that the activities of DUKE employees, faculty members, students, and/or agents in their performance of their respective responsibilities at DUKE (excluding any research or other responsibilities such individuals may have as a result of an association each may have with LICENSEE and/or AFFILIATES and/or SUBLICENSEES) infringe the intellectual property of a THIRD PARTY.

14.02 DUKE MAKES NO REPRESENTATIONS NOR EXTENDS ANY WARRANTIES OF ANY KIND. IN PARTICULAR, THERE ARE NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR THAT THE USE OF THE PATENT RIGHTS DOES NOT INFRINGE ANY PATENT, COPYRIGHT, TRADEMARK OR OTHER RIGHTS. IN ADDITION, NOTHING IN THIS AGREEMENT SHALL BE DEEMED TO BE A REPRESENTATION OR WARRANTY BY DUKE OF THE VALIDITY OF ANY OF THE PATENT RIGHTS OR THE ACCURACY, SAFETY, EFFICACY, OR USEFULNESS, FOR ANY PURPOSE, OF THE PATENT RIGHTS DUKE SHALL HAVE NO OBLIGATION, EXPRESS OR IMPLIED, TO SUPERVISE, MONITOR, REVIEW OR OTHERWISE ASSUME RESPONSIBILITY FOR THE PRODUCTION, MANUFACTURE, TESTING, MARKETING OR SALE OF ANY LICENSED PRODUCT OR LICENSED PROCESS. (FOR AVOIDANCE OF DOUBT, IT IS UNDERSTOOD AND AGREED THAT ANY SUCH ACTIVITY DESCRIBED IN THE PRECEDING SENTENCE BY ONE OR MORE OF THE INVENTORS OR ANY OTHER DUKE TRUSTEE, FACULTY MEMBER, EMPLOYEE, STUDENT, AND/OR AGENT SHALL BE DEEMED TO BE OUTSIDE THEIR RESPECTIVE CAPACITY AS A DUKE TRUSTEE, FACULTY MEMBER, EMPLOYEE, STUDENT, AND/OR AGENT, AS THE CASE MAY BE.) FURTHER, DUKE SHALL HAVE NO LIABILITY WHATSOEVER TO LICENSEE, ITS AFFILIATES, SUBLICENSEES, OR ANY THIRD PARTIES FOR OR ON ACCOUNT OF ANY INJURY, LOSS, OR DAMAGE, OF ANY KIND OR NATURE, SUSTAINED BY, OR ANY DAMAGE ASSESSED OR ASSERTED AGAINST, OR ANY OTHER LIABILITY INCURRED BY OR IMPOSED UPON LICENSEE OR ANY OTHER PERSON OR ENTITY, ARISING OUT OF OR IN CONNECTION WITH OR RESULTING FROM:

(a) the production, use, practice, offering, lease, or sale of any LICENSED PRODUCT or LICENSED PROCESS;

(b) the use of the PATENT RIGHTS; or

(c) any advertising or other promotional activities with respect to any of the foregoing.

14.03 Neither party hereto is an agent of the other party for any purpose whatsoever.

ARTICLE 15 - USE OF A PARTY'S NAME

15.01 Neither party will, without the prior written consent of the other party:

(a) use in any publication, advertising, publicity, press release, promotional activity or otherwise, any trade-name, personal name, trademark, trade device, service mark, symbol, image, icon, or any abbreviation, contraction or simulation thereof owned by the other party;

(b) use the name or image of any employee, faculty member, student, or agent of the other party in any publication, publicity, advertising, press release, promotional activity or otherwise; or

(c) represent, either directly or indirectly, that any product or service of the other party is a product or service of the representing party or that it is made in accordance with or utilizes the information or documents of the other party.

ARTICLE 16 - SEVERANCE AND WAIVER

16.01 Each clause of this AGREEMENT is a distinct and severable clause and if any clause is deemed illegal, void or unenforceable, the validity, legality or enforceability of any other clause or portion of this AGREEMENT will not be affected thereby.

16.02 The failure of a party in any instance to insist upon the strict performance of the terms of this AGREEMENT will not be construed to be a waiver or relinquishment of any of the terms of this AGREEMENT, either at the time of the party's failure to insist upon strict performance or at any time in the future, and such terms will continue in full force and effect.

ARTICLE 17 - TITLES

17.01 All titles and article headings contained in this AGREEMENT are inserted only as a matter of convenience and reference. They do not define, limit, extend or describe the scope of this AGREEMENT or the intent of any of its provisions.

ARTICLE 18 - SURVIVAL OF TERMS

18.01 The provisions of ARTICLES 2.04, 2.09, 3 (as regards financial obligations described therein incurred during the term of this Agreement), 5 (as regards obligations for reports and payments due to Duke for activities occurring during the term of this Agreement), 6, 7, 8, (to the extent, but only to the extent, that such infringement occurs during the term of this Agreement and excluding Section 8.06 which shall only apply during the term of this Agreement), .11, 12, 13, 14, 15, 16, 18, 19 shall survive the expiration or termination of this AGREEMENT.

ARTICLE 19 - GOVERNING LAW

19.01 This AGREEMENT shall be construed as having been entered into in the State of North Carolina and shall be interpreted in accordance with and its performance governed by the laws of the State of North Carolina. Notwithstanding the foregoing, questions affecting the construction and effect of any patent in PATENT RIGHTS shall be determined by the law of the country in which the patent was granted.

ARTICLE 20 - ENTIRE UNDERSTANDING

20.01 This AGREEMENT represents the entire understanding between the parties, and supersedes all other agreements, express or implied, between the parties concerning the subject matter hereof, and shall not be subject to any change or modification except by the execution of a written instrument subscribed to by the parties hereto.

[Signature page follows]

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT on the dates set forth below.

DUKE UNIVERSITY

By: /s/ Rose Ritts
Rose Ritts, Ph.D.
Executive Director
Office of Licensing and Ventures

Date: 4/17/2006

Precision BioSciences, Inc.

By: /s/ Matthew Kane
Matthew Kane
CEO

Date: 4/17/2006

Read and Understood by the INVENTORS

By: /s/ Homme Hellinga
Homme Hellinga, Ph.D.

Date: 4/24/2006

By: /s/ Jeff Smith
Jeff Smith, Ph.D.

Date: 4/17/2006

By: /s/ Derek Jantz
Derek Jantz, Ph.D.

Date: 4/17/2006

APPENDIX A

[***]

APPENDIX B

Milestones

COMMERCIALIZATION SCHEDULE
(year one starts the day the license is executed by DUKE)

[***]
[***]
[***]
[***]
[***]
[***]
[***]
[***]
[***]
[***]

APPENDIX C

Milestone payments

Milestone	Amount due DUKE
1) Closing of Series A Financing in excess of $1 million	[***]
2) First signed partnership with guaranteed payments in excess of $1 million	[***]
3) First commercial seed trait brought to market by PBI or partner	[***]
4) First human therapeutic brought to market by PRI or partner	[***]

APPENDIX D

As per the attached XL file titled “standard royrpt format”

APPENDIX E
[***]

APPENDIX F
[***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

AMENDMENT TO LICENSE AGREEMENT

THIS AMENDMENT to License Agreement (the "Amendment"), dated as of May 31, 2007, is entered into by and between Duke University, a nonprofit educational and research institution organized under the laws of North Carolina ("Duke") and Precision BioSciences, Inc., a Delaware corporation ("Precision", and collectively with Duke, the "Parties"). All capitalized terms used herein and not otherwise defined shall have the meaning given to them in the License Agreement (as defined below).

WHEREAS, the Parties entered into that certain License Agreement, dated April 17, 2006 (the "License Agreement"), whereby Precision licensed certain PATENT RIGHTS from Duke; and

WHEREAS, the Parties wish to amend the License Agreement to [***] the royalty payments and sublicense fees payable to Duke under certain circumstances.

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein, the receipt and sufficiency of which are hereby acknowledged, the Parties hereto agree as follows:

1. Section 3.01(c) shall be deleted in its entirety and replaced with the following:

(c) (i) Royalty on NET SALES. At the times and in the manner set forth hereinafter, LICENSEE and it AFFILIATES shall pay to DUKE a [***] royalty on NET SALES of LICENSED PRODUCTS or LICENSED PROCESSES, by LICENSEE, and/or its AFFILIATES. Such royalty shall be at the rate of:

(A) [***] of NET SALES for LICENSED PRODUCTS;

(B) [***] of NET SALES for LICENSED PROCESSES.

(ii) Where in order to manufacture, sell, use, practice or otherwise dispose of LICENSED PRODUCTS or LICENSED PROCESSES it is [***] for LICENSEE to obtain a license under any patent rights from a THIRD PARTY (including in settlement of a claim contemplated by Article 7.01) and by reason of an agreement with such THIRD PARTY a royalty on LICENSEE NET SALES (or similarly defined amount) is payable to such THIRD PARTY, the royalty payable pursuant to this Article 3.01(c) shall be reduced by [***] of the amounts paid to third parties provided that under no circumstances will the royalty payable to DUKE on NET SALES of LICENSED PRODUCTS or LICENSED PROCESSES reduce to less than [***].

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

(iii) Where the development, manufacture, importation, use, lease, sale or distribution of LICENSED PRODUCTS or LICENSED PROCESSES utilizes or incorporates technology owned by LICENSEE (the "LICENSEE TECHNOLOGY"), the royalty payable pursuant to this Article 3.01(c) shall be reduced by [***].

Notwithstanding anything to the contrary in this Article 3.01 (c), the royalties payable to DUKE on NET SALES of LICENSED PRODUCTS or LICENSED PROCESSES shall not be lower than [***].

2. The following language shall be added to the end of Section 3.01(e):

Where the development, manufacture, importation, use, lease, sale or distribution of LICENSED PRODUCTS or LICENSED PROCESSES utilizes or incorporates LICENSEE TECHNOLOGY, the SUBLICENSE FEE payable pursuant to Article 3.01(e)(i) shall be reduced to [***] or the SUBLICENSE FEE payable pursuant to Article 3.01(e)(ii) shall be reduced to [***].

IN WITNESS WHEREOF, the Parties have each caused this Amendment to be executed by its duly authorized representative.

DUKE UNIVERSITY		**PRECISION BIOSCIENCES, INC.**	
By:	/s/ Rose Ritts	By:	/s/ Matthew Kane
Name:	Rose Ritts, Ph.D. Executive Director	Name:	Matthew Kane
Title:	Office of Licensing & Ventures Duke University & DUMC	Title:	CEO

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

PRECISION BIOSCIENCES, INC.
104 T.W. Alexander Drive, Bldg #7
P.O. Box 12292
Research Triangle Park, NC 27709

December 10, 2007

Office of Science and Technology
Duke University
Attn: Agreement Coordinator
Box 90083
Durham, NC 27708

To Whom This May Concern:

Reference is made to the License Agreement, dated as of April 17, 2006, by and between Duke University and Precision BioSciences, Inc. ("PB") (as amended, the "License Agreement").

This is a clarification of the definition of the term "Patent Rights," which is set forth in paragraph 1.04 of the License Agreement. Specifically, the term "Patentably Distinct," as used therein, is not intended by the parties to the License Agreement to apply to any of the patents and/or patent application(s) listed in Appendix A of the License Agreement, including any and all divisionals, continuations, and/or continuations-in-part (only to the extent set forth in paragraph 1.04 of the License Agreement) which constitute any of the Patent Rights licensed to PB thereunder and which may be sublicensed by PB to a third party pursuant to the terms of the License Agreement.

Please sign both copies this letter where indicated below and return one copy to PB at the address set forth above. Thank you for your assistance with this matter.

Sincerely,

/s/ Matthew Kane

Matthew Kane
President and Chief Executive Officer

Acknowledge and Agreed:

DUKE UNIVERSITY

By: /s/ Rose Ritts

Name: Rose Ritts, Ph.D.

Title: Executive Director, Duke Office of Licensing & Ventures

PRECISION BIOSCIENCES, INC.
104 T.W. Alexander Drive, Bldg #7
P.O. Box 12292
Research Triangle Park, NC 27709

February13, 2009

Office of Science and Technology
Duke University
Attn: Agreement Coordinator
Box 90083
Durham, NC 27708

To Whom This May Concern:

Reference is made to the License Agreement, dated as of April 17, 2006, by and between Duke University ("Duke") and Precision BioSciences, Inc. ("Precision") as amended on May 31, 2007, and as clarified by letter agreement on December 10, 2007, (collectively, the "Duke License Agreement"). Precision proposes to enter into an agreement (the "[***] License Agreement") with [***] ("[***]") pursuant to which Precision would grant to [***] among other things a sublicense under the rights and licenses granted to Precision under the Duke License Agreement. In connection with Precision's proposal to enter into the [***] License Agreement, Duke and Precision wish to clarify certain terms and conditions of the Duke License Agreement, as follows. Terms not defined herein have the meaning ascribed to them in the Duke License Agreement,

I. Section 2.03 of the Duke License Agreement states that "All SUBLICENSES shall be subject to the terms and conditions of this AGREEMENT, shall be no less favorable to or protective of DUKE than this AGREEMENT except as expressly stated in this AGREEMENT, and shall not be further sublicenseable without the express written approval of DUKE, such approval not to be unreasonably withheld." The parties hereby agree that the express written approval requirement shall not apply to the following types of sublicenses entered into by a sublicensee of Precision (a "Precision Sublicensee"):

   (a) Sublicenses of a Licensed Product or Licensed Products by a Precision Sublicensee to a third party, under which such third party may make, use, sell, offer for sale, import, distribute or otherwise exploit such Licensed Product or Licensed Products;

   (b) Sublicenses by a Precision Sublicensee to a third party for such third party to practice the Patent Rights in order to perform work on the Precision Sublicensee's behalf; or

   (c) Further sublicenses of any sublicense entered into in accordance with either of sub-sections (a) or (b) above.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

II. Section 2.03 of the Duke License Agreement further states that "In the event of any termination of this Agreement, all SUBLICENSES shall survive such termination provided that the SUBLICENSEES are in compliance with the terms and conditions of the SUBLICENSE and the SUBLICENSEES comply with all terms of this Agreement related to such SUBLICENSE including the payment of all amounts that would be due DUKE under this Agreement if it had not terminated." The parties hereby agree that in the event of any termination of the Duke License Agreement (including without limitation termination under Section 3.04 of the Duke License Agreement), the requirement that a Precision Sublicensee comply with the terms of Precision's sublicense to the Precision Sublicensee (the "Primary Sublicense") and the Duke License Agreement shall mean the following with respect to payment obligations:

[***]

III. The parties hereby agree that Section 2.03 of the Duke License Agreement (as regards the survival of sublicenses) survives termination of the Duke License Agreement.

Remainder of Page Intentionally Left Blank

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Please sign and return a copy of this letter to us to acknowledge our mutual agreement on this matter. Thank you for your assistance.

PRECISION BIOSCIENCES, INC.

By: /s/ Matthew Kane
Matthew Kane
Chief Executive Officer

Acknowledged and Agreed:

DUKE UNIVERSITY

By: /s/ Rose Ritts
Name: Rose Ritts, PhD
Title: Executive Director Office of Licensing & Ventures
Duke University & DUMC

PRECISION BIOSCIENCES, INC.
302 East Pettigrew Street
Dibrell Building, Suite A-100
Durham, NC 27701

January 17, 2012

Office of Licensing and Ventures
Duke University
Attn: Agreement Coordinator
Box 90083
Durham, NC 27708

To Whom This May Concern:

Reference is made to the License Agreement, dated as of April 17, 2006, by and between Duke University ("Duke") and Precision BioSciences, Inc. ("Precision") as amended on May 31, 2007, and as clarified by letter agreements on December 10, 2007 and February 13, 2009 (collectively, the "Duke License Agreement"). Precision proposes to enter into the agreement attached hereto as Exhibit A (the "Plantco License Agreement") with Precision PlantSciences, Inc. ("Plantco"), a wholly-owned subsidiary of Precision formed to conduct business exclusively in the plant field, pursuant to which Precision would grant to Plantco among other things a sublicense under the rights and licenses granted to Precision under the Duke License Agreement.

In connection with Precision's proposal to enter into the Plantco License Agreement, Duke and Precision wish to clarify certain terms and conditions of the Duke License Agreement, as follows. Terms not defined herein have the meaning ascribed to them in the Duke License Agreement.

1. Section 1.14 of the Duke License Agreement states that "'SUBLICENSE REVENUES' shall mean any and all upfront fees, license fees, royalties, option fees, milestone payments, and other amounts payable to LICENSEE (and/or its AFFILIATES, as the case maybe) under a SUBLICENSE to any of the licenses granted by DUKE to LICENSEE under this AGREEMENT."

    a. The parties hereby agree that as long as Plantco remains an AFFILIATE of Precision, [***]. [***]. The foregoing is illustrated for convenience by the example chart set forth below.

    Example: SUBLICENSE FEES while Precision and Plantco are AFFILIATES

	[***]	[***]	[***]
Example 1	[***]	[***]	[***]
Example 2	[***]	[***]	[***]
Example 3	[***]	[***]	[***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

b. The parties hereby agree that at such time as Plantco no longer remains an AFFILIATE of Precision, Duke will be entitled in accordance with the Duke License Agreement to [***].

2. Section 2.03 of the Duke License Agreement states that "All SUBLICENSES shall be subject to the terms and conditions of this AGREEMENT, shall be no less favorable to or protective of DUKE than this AGREEMENT except as expressly stated in this AGREEMENT, and shall not be further sublicenseable without the express written approval of DUKE, such approval not to be unreasonably withheld." Without limiting anything set forth in the letter agreement between the parties dated February 13, 2009, the parties hereby agree that the express written approval requirement shall not apply to any SUBLICENSES entered into by Plantco or, to the extent described in such letter agreement, Plantco's sublicensees; provided, however, that Plantco provides Duke with a copy of any SUBLICENSES entered into by Plantco [***] prior to execution of each subject SUBLICENSE with the ability to review and comment, such comments to be reasonably considered by Plantco, and Plantco provides Duke with an executed copy of such SUBLICENSE within [***] of the effective date of such SUBLICENSE.

3. Article 7 of the Duke License Agreement provides LICENSEE with certain rights and obligations with respect to infringement of THIRD PARTY rights. Duke agrees that for so long as Plantco remains an AFFILIATE of Precision, each instance of the term "LICENSEE" in Article 7 of the Duke License Agreement shall be deemed to mean "LICENSEE and/or Precision PlantSciences, Inc., as applicable." For clarity, as long as Plantco remains an AFFILIATE of Precision, in accordance with Section 7.01(b) of the Duke License Agreement, [***].

4. Article 8 of the Duke License Agreement provides LICENSEE with certain rights to enforce the PATENT RIGHTS against potential infringers. Duke agrees that to the extent that LICENSEE grants a SUBLICENSEE such enforcement rights, each instance of the term "LICENSEE" in Article 8 of the Duke License Agreement shall be deemed to mean "LICENSEE and/or SUBLICENSEE, as applicable" and that Duke will cooperate with any such SUBLICENSEE as set forth in Section 8,05 of the Duke License Agreement as if such SUBLICENSEE were a party to the Duke License Agreement. For clarity, if such SUBLICENSEE enforces the PATENT RIGHTS and there is a balance remaining from recovery of damages by SUBLICENSEE, in accordance with Section 8.03 of the Duke License Agreement, [***].

Duke acknowledges that Precision will be assigning to Plantco (as an AFFILIATE of Precision) the following SUBLICENSES in accordance with their terms: (i) License Agreement between [***] and Precision dated [***], (ii) Research and Commercial Option Agreement between [***] and Precision dated [***], and (iii) Research and Commercial Option Agreement between [***] and Precision dated [***], each as amended from time to time (collectively, the "Existing Plant Sublicenses"). In support thereof, Duke acknowledges and agrees that the Plantco License Agreement constitutes a valid SUBLICENSE under and is consistent with the terms of the Duke License Agreement as modified herein, and the Existing Plant Sublicenses, upon such assignment,

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[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

shall continue to constitute valid SUBLICENSES under the Duke License Agreement consistent with the terms thereof as so modified. Duke further acknowledges and agrees that in the event of any termination of the Duke License Agreement, the Existing Plant Sublicenses shall survive such termination in accordance with Section 2.03 of the Duke License Agreement.

Subject to any confidentiality or nondisclosure obligations to any third parties or legal restrictions, Precision agrees to provide Duke with a copy of any proposed amendment to the Plantco License Agreement prior to the execution thereof with the ability to review and comment for a reasonable period (but not to exceed [***], such comments to be reasonably considered by Precision.

Please sign and return a copy of this letter to us to acknowledge our mutual agreement on this matter. Thank you for your assistance.

PRECISION BIOSCIENCES, INC.

By: /s/ Matthew Kane 1/18/2012
Matthew Kane
Chief Executive Officer

Acknowledged and Agreed:

DUKE UNIVERSITY

By: /s/ Rose Ritts 1/17/2012
Name: Rose Ritts, PhD
Title: Executive Director Office of Licensing & Ventures Duke University & DUMC

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

EXHIBIT A

PLANTCO LICENSE AGREEMENT

PRECISION BIOSCIENCES, INC.
302 East Pettigrew Street
Dibrell Building, Suite A-100
Durham, NC 27701

December 6, 2013

Office of Licensing and Ventures
Duke University
Attn: Agreement Coordinator
Box 90083
Durham, NC 27708

To Whom This May Concern:

Reference is made to the License Agreement, dated as of April 17, 2006, by and between Duke University ("Duke") and Precision BioSciences, Inc. ("Precision") as amended on May 31, 2007, and as clarified by letter agreements on December 10, 2007, February 13, 2009, and January 17, 2012 (collectively, the "Duke License Agreement"). Duke and Precision now wish to acknowledge and agree that the milestones listed in the COMMERCIALIZATION SCHEDULE in APPENDIX B of the Duke License Agreement have been achieved and fully satisfied.

Please sign and return a copy of this letter to us to acknowledge our mutual agreement on this matter. Thank you for your assistance.

PRECISION BIOSCIENCES, INC.

By: /s/ Matthew Kane
Matthew Kane
Chief Executive Officer

Acknowledged and Agreed:

DUKE UNIVERSITY

By: /s/ Rose Ritts
Name: Rose Ritts, PhD
Title: Executive Director Office of Licensing & Ventures
Duke University & DUMC

PRECISION BIOSCIENCES, INC.
302 East Pettigrew Street
Dibrell Building, Suite A-100
Durham, NC 27701

December 13, 2013

Office of Licensing and Ventures
Duke University
Attn: Agreement Coordinator
Box 90083
Durham, NC 27708

To Whom This May Concern:

Reference is made to the License Agreement, dated as of April 17, 2006, by and between Duke University ("Duke") and Precision BioSciences, Inc. ("Precision") as amended on May 31, 2007, and as clarified by letter agreements on December 10, 2007, February 13, 2009, January 17, 2012, and December 6, 2013 (collectively, the "Duke License Agreement"). As Precision has discussed with Duke, Precision's business model may from time to time include the creation and licensing of products such as a modified cell line, a mouse with a modified genome, or a therapeutic, each created, in part, through use of Precision's meganuclease technology and licensed to customers for commercial applications. Because the financial dynamics of these transactions are more akin to sales of a product than a typical technology "sublicense", the parties wish to modify the financial provisions of the Duke License Agreement to facilitate Precision's efforts to execute on this new business model. The parties anticipate that Precision's success in such execution will greatly benefit Duke by operation of the Duke License Agreement.

1. Terms not defined herein have the meaning ascribed to them in the Duke License Agreement.

2. Duke and Precision agree that SUBLICENSES to make, use, sell, offer for sale, import, distribute or otherwise exploit LICENSED PRODUCTS created by Precision and/or its AFFILIATES (including derivatives thereof), where such SUBLICENSE includes the right to use a LICENSED PRODUCT (or derivative) and where the applicable SUBLICENSE includes a negotiated royalty rate that may equal [***], shall constitute "Commercial Product Sublicenses" and shall be subject to the remaining terms of this letter agreement. For clarity, but without limiting the foregoing, a SUBLICENSE that satisfies the foregoing royalty rate criteria and that includes a LICENSED PRODUCT (or derivative) constituting [***], shall be considered Commercial Product Sublicenses. [***].

3. Duke and Precision agree that Commercial Product Sublicenses shall, in lieu of the SUBLICENSE FEES set forth in Section 3.01(e) of the Duke License Agreement, bear a SUBLICENSE FEE equal to the applicable percent of SUBLICENSE REVENUES from such Commercial Product Sublicenses as set forth in the following chart:

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Highest Negotiated Royalty Rate in Commercial Product Sublicense:	3.01(e)(i) SUBLICENSE FEE = ___ Percent of SUBLICENSE REVENUES from royalties	3.01(e)(ii) SUBLICENSE FEE = ___ Percent of SUBLICENSE REVENUES from non-royalties
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]
[***]	[***]	[***]

4. Duke and Precision agree that all Commercial Product Sublicenses shall be entered into on terms consistent with and shall be subject to the terms and conditions of the Duke License Agreement, except that the second and eighth sentences of Section 2.03 of the Duke License Agreement shall not apply to Commercial Product Sublicenses, and notwithstanding the first sentence of Section 2.03 of the Duke License Agreement, Commercial Product Sublicenses shall be freely sublicenseable without the express written approval of Duke. Except as specifically modified in this letter agreement, all provisions of the Duke License Agreement applicable to SUBLICENSES shall apply to Commercial Product Sublicenses.

Please sign and return a copy of this letter to us to acknowledge our mutual agreement on this matter. Thank you for your assistance.

PRECISION BIOSCIENCES, INC.

By: /s/ Matthew Kane
Matthew Kane
Chief Executive Officer

Acknowledged and Agreed:

DUKE UNIVERSITY

By: /s/ Rose Ritts
Name: Rose Ritts, PhD
Title: Executive Director Office of Licensing & Ventures
Duke University & DUMC

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

PATENT CROSS-LICENSE AGREEMENT

This Patent Cross-License Agreement (**"Agreement"**) is made as of January 23, 2014 (**"Effective Date"**) by and between the following:

Cellectis SA, a French corporation with its principal place of business at 8, rue de la Croix Jarry, 75013 Paris, France (**"Cellectis"**); and **Precision BioSciences, Inc.**, a Delaware corporation with its principal place of business at 302 East Pettigrew Street, Dibrell Building, Suite A-100, Durham, North Carolina 27701 (**"Precision"**).

Cellectis and Precision are each referred to herein as a **"Party"** and collectively as the **"Parties."**

RECITALS

WHEREAS, Precision owns or controls certain patents and patent applications covering Engineered I-Crel Meganuclease (defined below) technology that is useful for modifying the genome of cells, including for biomanufacturing purposes and certain other uses;

WHEREAS, Cellectis owns or controls certain patents and patent applications covering Engineered I-Crel Meganuclease technology that is useful for modifying the genome of cells, including for biomanufacturing purposes and certain other uses;

WHEREAS, the Parties are entering into a Settlement Agreement (the **"Settlement Agreement**"), and Precision is entering into a Stipulation of Dismissal with Lonza Group Ltd. and certain of its Affiliates, pursuant to which the Parties have agreed to settle certain disputes between them, including the Pending Litigations (defined below);

WHEREAS, this Agreement shall have no force or effect until such time as the Parties have signed the Settlement Agreement and satisfied the obligations set forth in Article 2 and Article 3 of the Settlement Agreement with respect to filing the Stipulations of Dismissal and the Stipulation of Dismissal With Prejudice of the Lonza Litigation set forth in such Articles; and

WHEREAS, the Parties have agreed to enter into this Agreement to establish cross-licenses to the Licensed Precision Patents and Licensed Cellectis Patents (each defined below), as consideration for one another and in further consideration for each Party's entry into the Settlement Agreement, which cross-licenses shall provide each Party with certain non-exclusive patent rights with respect to Engineered I-Crel Meganuclease technology.

NOW, THEREFORE, in consideration of the mutual covenants, representations, warranties and other terms and conditions contained herein and in the Settlement Agreement, the sufficiency of which is hereby acknowledged, the Parties hereto agree as follows:

ARTICLE 1. DEFINITIONS

In addition to other terms defined elsewhere herein, the following terms, as used in this Agreement, shall have the meanings indicated:

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

1.1. **"Affiliate"** shall mean any corporation, firm, partnership, entity or other person that directly or indirectly controls, is controlled by, or is under common control with a Party; where "control" means the capacity to designate, appoint or otherwise determine the board of directors or other governing authority of such person, whether by law or in fact, or whether by ownership of more than fifty percent (50%) of the equity or other ownership interests of such person (or such lesser percentage which is the maximum allowed to be owned by a foreign corporation in a particular jurisdiction).

1.2. **"Control"** with respect to a Party's rights in or to a Patent, means that the Party owns the Patent, or has the right to grant licenses or immunities from suit (other than pursuant to the rights granted in this Agreement) to the other Party, or bring or release claims or actions for infringement of such Patent as to the other Party, each without violating the terms of any agreement or other arrangement with any Third Party.

1.3. **"Design"** shall mean, with respect to any person or entity, the design of Engineered I-Crel Meganucleases by such person or entity, whether for itself or for or on behalf of any Third Party; provided, however, that "Design" does not include [***].

1.4. **"Engineered I-Crel Meganuclease"** shall mean a [***].

1.5. **"Exclusive Field"** shall have the meaning set forth in Article 2.1.2.

1.6. **"Existing Licensee"** shall mean a licensee under the licenses (the "**Existing Licenses**") in effect prior to the Effective Date granting to a Third Party any rights under any of the Licensed Cellectis Patents (with respect to licenses granted by Cellectis) or Licensed Precision Patents (with respect to licenses granted by Precision).

1.7. **"Field"** shall mean any and all fields of use.

1.8. **"Licensee"** shall mean:

(i) with respect to Licensed Cellectis Patents, Precision and its Affiliates.

(ii) with respect to Licensed Precision Patents, Cellectis and its Affiliates.

1.9. **"Licensor"** shall mean:

(i) with respect to Licensed Cellectis Patents, Cellectis and its Affiliates.

(ii) with respect to Licensed Precision Patents, Precision and its Affiliates.

1.10. **"Licensed Cellectis Patents"** shall mean any Patent Controlled by Cellectis or its Affiliates that contains one or more claims claiming a priority date prior to the Effective Date; which Patent also (i) was the basis of any claim asserted in the Pending Litigations (collectively, "**Litigated Cellectis Patents**") or (ii) [***]. Without limiting the foregoing, the Licensed Cellectis Patents shall include the Patents of the families of patents listed in **Exhibit A**, as may be updated from time to time by Cellectis during the Term (including an annual update on the anniversary date of the Effective Date, if applicable, and an update if Cellectis later discovers a Patent that should have been listed in **Exhibit A**). For the further sake of clarity, an application listed on **Exhibit A** that, at any time, falls within the foregoing definition of Licensed Cellectis Patents later shall no longer be a Licensed Cellectis Patent if, subsequently during its prosecution

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[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

as an application and on issuance as a patent, it no longer satisfies the requirements of this definition. For further clarity, practice of the subject matter of a patent that does not meet the foregoing definition is not authorized under this Agreement.

1.11. "Product" shall mean any product [***].

1.12. "Licensed Patents" shall mean:

(i) when the Licensee is Precision or its Affiliates: Licensed Cellectis Patents

(ii) when the Licensee is Cellectis or its Affiliates: Licensed Precision Patents.

1.13. "Licensed Precision Patents" shall mean any Patent Controlled by Precision or its Affiliates that contains one or more claims claiming a priority date prior to the Effective Date, which Patent also (i) was the basis of any claim asserted in the Pending Litigations (collectively, "**Litigated Precision Patents**") or (ii) [***]. Without limiting the foregoing, the Licensed Precision Patents shall include the Patents listed in **Exhibit B**, as may be updated from time to time by Precision during the Term (including an annual update on the anniversary date of the Effective Date, if applicable, and an update if Precision later discovers a Patent that should have been listed in **Exhibit B**). For the further sake of clarity, an application listed on **Exhibit B** that, at any time, falls within the foregoing definition of Licensed Precision Patents later shall no longer be a Licensed Precision Patent if, subsequently during its prosecution as an application and on issuance as a patent, it no longer satisfies the requirements of this definition. For further clarity, practice of the subject matter of a patent that does not meet the foregoing definition is not authorized under this Agreement.

1.14. "Litigated Patents" shall mean the Litigated Cellectis Patents and Litigated Precision Patents.

1.15. "Ongoing Proceedings" shall mean the proceedings listed in **Exhibit E**.

1.16. "Patent" shall mean the rights and interests in and to any and all issued patents and pending patent applications (including inventors certificates and utility models) in any country or jurisdiction, including any and all provisionals, non-provisionals, substitutions, continuations, continuations-in-part, divisionals and other continuing applications, supplementary protection certificates, renewals and letters patent on any of the foregoing, and any and all reissues, reexaminations, extensions, confirmations, registrations and patents of addition, as well as any patent resulting from any post-grant proceeding provided under Title 35 of the U.S. Code.

1.17. "Pending Litigations" shall mean the litigation cases pending as of the Effective Date, under the docket numbers set forth on **Exhibit C**.

1.18. "Term" shall mean the time period from the Effective Date until the date on which the last Valid Claim within the Licensed Patents ceases to be in effect.

1.19. "Territory" shall mean any and all countries throughout the world in which Licensed Patents are in force or are pending during the Term.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

1.20. **"Third Party"** shall mean any and all persons, other than Cellectis and its Affiliates, and Precision and its Affiliates.

1.21. **"Valid Claim"** shall mean any claim contained in an issued and unexpired Licensed Patent, which claim has not been held unenforceable, unpatentable or invalid by a decision of a court or other governmental agency or competent jurisdiction, unappealable or unappealed within the time allowed for appeal, and which has not been admitted to be invalid or unenforceable through abandonment, reissue, disclaimer or otherwise.

ARTICLE 2. CROSS-LICENSES

2.1. Non-exclusive License to Precision in the Field; Non-exclusive License to Cellectis in the Field

2.1.1. Subject to the terms and conditions of this Agreement, Cellectis, on behalf of itself and its Affiliates, hereby grants to Precision and its Affiliates a non-exclusive, sublicensable (pursuant to Article 2.1.4), fully paid-up, royalty-free license under the Licensed Cellectis Patents to make, have made, use, lease, transfer, sell, offer for sale, export, import and otherwise exploit Engineered I-Crel Meganucleases or Products within the Field (except within the Exclusive Field, as specified in Article 2.1.2) in the Territory.

2.1.2. The Parties acknowledge that, prior to the Effective Date, Cellectis has entered into an Existing License pursuant to which Cellectis has granted certain exclusive license rights under certain of the Licensed Cellectis Patents within the field listed in **Exhibit F** (the **"Exclusive Agreement"**) to the counterparty to such Existing License (the **"Cellectis Exclusive Licensee"**). The Parties agree that, during the period in which any such exclusive rights under those Licensed Cellectis Patents that have actually been granted by Cellectis to a Cellectis Exclusive Licensee in such field pursuant to the Exclusive Agreement remain exclusive and in full force and effect, the license granted to Precision pursuant to Article 2.1.1 shall not include any rights within the scope of such exclusive license granted by Cellectis to such Cellectis Exclusive Licensee (the **"Exclusive Field**"), solely as and to the extent necessary for Cellectis to be in compliance with such exclusive rights grants to such Cellectis Exclusive Licensee. Likewise, during such period the license granted to Cellectis pursuant to Article 2.1.3 shall not include any rights within the Exclusive Field. At such time as any such exclusive rights granted by Cellectis under the Exclusive Agreement cease, in whole or in part, to be exclusive or to be in full force and effect (a **"Non-exclusivity Event"**), effective automatically without any further action required by either of the Parties, such rights, to the full extent that they are no longer licensed exclusively to a Cellectis Exclusive Licensee under the Exclusive Agreement and would otherwise be part of the non-exclusive rights granted under this Agreement, shall be removed from the Exclusive Field and included under each of the non-exclusive license granted to Precision in the Field pursuant to Article 2.1.1 and the non-exclusive license granted to Cellectis in the Field pursuant to Article 2.1.3. Within thirty (30) days of Cellectis's first awareness of the occurrence of a Non-exclusivity Event, Cellectis shall notify Precision in writing of the scope of rights that are the subject of such Non-exclusivity Event, and the Parties promptly shall update **Exhibit F** in order to properly reflect the additional scope of non-exclusive rights that has been granted to Precision and Cellectis, if applicable. Beginning within a reasonable time of the Effective Date, Cellectis shall use reasonable efforts to cause all license rights granted under the Licensed Cellectis Patents that are included within the Exclusive Agreement to be amended to be non-

exclusive. Without limiting the foregoing, Cellectis shall not, except as required by the terms of the Exclusive Agreement as of the Effective Date, amend the Exclusive Agreement in a manner that would reduce or restrict Precision's rights under this Agreement without the prior written consent of Precision. The Parties agree that it shall not be a breach of this Agreement if Cellectis is unable to secure any such amendment to the Exclusive Agreement, notwithstanding its reasonable efforts to achieve same, and Cellectis makes no representations or warranties that it will be able to amend the Exclusive Agreement in the foregoing manner or any other manner.

2.1.3. Subject to the terms and conditions of this Agreement, Precision, on behalf of itself and its Affiliates, hereby grants to Cellectis and its Affiliates a non-exclusive, sublicensable (pursuant to Article 2.1.4), fully paid-up, royalty-free license under the Licensed Precision Patents to make, have made, use, lease, transfer, sell, offer for sale, export, import and otherwise exploit Engineered I-Crel Meganucleases or Products within the Field (except within the Exclusive Field, as specified in Article 2.1.2) in the Territory.

2.1.4. Each Party and its Affiliates (the **"Sublicensor"**) may grant sublicenses (**"First Tier Sublicenses"**) under the license grants in this Article 2.1 solely (a) to an Existing Licensee; or (b) to a Third Party (subject to the restrictions in Article 5.5) (together with an Existing Licensee, a **"Sublicensee"**), in each case pursuant to an agreement with such Sublicensee wherein the license grant to the Sublicensee under the Sublicensor's own Licensed Patents is at least as broad in scope of rights granted as the license granted to the Sublicensee under the other Party's Licensed Patents. However, for the sake of clarity, the remaining terms and conditions of any such Sublicense to a Sublicensee need not be the same for the Sublicensor's own Licensed Patents as compared to the other Party's Licensed Patents being licensed to the Sublicensee. Any First Tier Sublicense may be further sublicenseable by Sublicensee only pursuant to the foregoing restrictions, as applied to the Sublicensee. Notwithstanding the foregoing, except pursuant to an Existing License in which rights to Design Engineered I-Crel Meganucleases were granted under a Party's own Licensed Patents as of the Effective Date, neither Party nor any of its Sublicensees may grant any Sublicensee a sublicense under the other Party's Licensed Patents to Design Engineered I-Crel Meganucleases. Subject to the foregoing, all sublicenses to Existing Licensees executed or otherwise automatically incorporated into an Existing License within the period of forty-five (45) days after the Effective Date shall be deemed to be effective as of the Effective Date, and the Parties acknowledge that, as of the Effective Date and as part of the Settlement Agreement, each Party's Existing Licensees are released by the other Party as set forth in the Settlement Agreement. Moreover, notwithstanding any other provision of this Agreement, the Parties agree that, as of the Effective Date of this Agreement, Cellectis shall have been deemed to have granted a First Tier Sublicense under the Licensed Precision Patents to Lonza Group Ltd. and/or certain of its Affiliates under the terms of this Agreement, pursuant to a sublicense granted by Cellectis to such Lonza entities, and the Parties acknowledge that the ongoing litigation against such Lonza entities shall be dismissed pursuant to the terms of the Settlement Agreement. The foregoing sublicense to such Lonza entities may be executed at any time after the Effective Date and shall have retroactive effect to the Effective Date.

2.2. Retained Rights. Each Party expressly retains any rights not expressly granted to the other Party under this Article 2 (or otherwise under this Agreement). Nothing in this Agreement shall be construed to effect a transfer or change in ownership with respect to either Party's Patents or other intellectual property rights.

2.3. **Duke Patents.** Precision represents and warrants, and Cellectis understands, that the licenses and rights granted by Precision or its Affiliates to Cellectis and its Affiliates under any Patent owned by Duke University ("**Duke**", and such Patents, the "**Duke IP**") are granted subject to the terms and conditions of the License Agreement entered into by Precision and Duke on April 17, 2006, as amended from time to time, including but not limited to Duke's right to practice under the Duke IP for its own internal, non-commercial, educational, research and clinical purposes, and subject to the rights of the United States Government and applicable limitations under 37 C.F.R. 401, Public Law 96-517 and Public Law 98-620 resulting from the United States Government's funding of research leading to creation of the Duke IP. Duke shall be a third party beneficiary of this Agreement to the extent its terms and conditions apply or relate to the Duke IP.

2.4. **No Other Licenses.** No right or license under or to any invention, information, know-how or other intellectual property or Patent is granted or shall be granted by implication or estoppel. All such rights or licenses are or shall be granted only as expressly provided in the terms of this Agreement. Neither Party shall be obligated to provide the other Party with: (i) any information other than that disclosed in the Licensed Patents, or (ii) any technical assistance, including hands-on technical support by such Party's personnel, relating to the practice of the Licensed Patents or manufacture or use of Engineered I-Crel Meganucleases.

2.5. **Rights in Bankruptcy.** If applicable, the Parties agree that all intellectual property rights licensed hereunder, including any Patents of a Party in any country covered by the license grants under this Agreement, are part of the "intellectual property" as defined under Section 101(35A) of the Bankruptcy Code subject to the protections afforded the non-terminating Party under Section 365(n) of the U.S. Bankruptcy Code, and any similar law or regulation in any other country.

2.6. **Registration of Licenses.** Each Party agrees to cooperate with the other Party regarding registration of the licenses granted under this Agreement, solely as may be required under the law in order to preserve or maintain any rights of such other Party under this Agreement, including by executing and recording with the appropriate authorities an appropriate short-form statement of license, if so required.

2.7. **Party Releases.** The Parties acknowledge that, as of the Effective Date and as part of the Settlement Agreement, each Party's Existing Licensees are released by the other Party as set forth in the Settlement Agreement.

ARTICLE 3. INVALIDITY CHALLENGES.

3.1. During the Term of this Agreement, except as required by law (e.g., compelled by subpoena) or in response to an infringement allegation in a court of competent jurisdiction, a Party to this Agreement shall not directly or indirectly commence, participate in or provide assistance to a Third Party with respect to a proceeding in any court or other administrative body of any sort (including any patent office in any country) related to (i) the validity, enforceability and/or patentability of any claim of any Litigated Patent Controlled by the other Party or its Affiliates, or (ii) an interference, derivation, re-examination, opposition, post-grant review or other form of patent challenge of any claim of any Litigated Patent Controlled by the other Party or its Affiliates. For the sake of clarity, notwithstanding the foregoing, a Party may participate as required in an interference proceeding initiated by the USPTO or in response to a subpoena, or as otherwise required by law.

3.2. During the Term of this Agreement, except as required by law (e.g., compelled by subpoena) or in response to an infringement allegation in a court of competent jurisdiction, a Party to this Agreement shall not directly or indirectly commence, participate in or provide assistance to a Third Party with respect to a proceeding in any court or other administrative body of any sort (including any patent office in any country) related to (i) the validity, enforceability and/or patentability of any claim of any other Licensed Patents Controlled by the other Party or its Affiliates, or (ii) an interference, derivation, re-examination, opposition, post-grant review or other form of patent challenge of any claim of any other Licensed Patents Controlled by the other Party or its Affiliates. For the sake of clarity, notwithstanding the foregoing, a Party may participate as required in an interference proceeding initiated by the USPTO or in response to a subpoena, or as otherwise required by law.

3.3. For clarity, the existence of the Ongoing Proceedings shall not be deemed to be a breach of or default under this Agreement by a Party, so long as such Party carries out all required acts specified in the Settlement Agreement and does not participate in or provide assistance to a Third Party with respect to any such Ongoing Proceeding in relation to the other Party's Patents after the Effective Date. For further clarity, a Party's participation after the Effective Date in a proceeding solely to defend the validity or enforceability of any Licensed Patents Controlled by such Party or its Affiliates (e.g., to defend a re-examination) shall not be deemed to be a breach of or default under this Agreement by such Party.

ARTICLE 4. CONSIDERATION; LICENSE REQUEST.

4.1. **Consideration.** The Parties acknowledge that each of the licenses and rights granted by each Party to the other Party, along with the benefits exchanged through the Settlement Agreement, individually and collectively, constitute good, valuable, and sufficient consideration for each and all of the other licenses, rights, and entry into the Settlement Agreement contemplated hereunder.

4.2. **Precision License Request.** From time to time during the Term, if Precision desires to obtain exclusive rights under the Licensed Cellectis Patents to make, have made, use, lease, transfer, sell, offer for sale, export or import Engineered I-Crel Meganucleases or products made using Engineered I-Crel Meganucleases within the Field or any particular field in the Territory, Precision shall provide Cellectis with a written notice requesting a license to Precision that would grant such rights to Precision (a "**Precision License Request**"). Upon Cellectis's receipt of a Precision License Request, provided that Cellectis has no obligation to a Third Party or under applicable law that would conflict with such Precision License Request (e.g., Cellectis has not previously granted rights to a Third Party with respect to the subject matter of the Precision License Request that are inconsistent in any way with the rights requested by Precision, as determined by Cellectis), Cellectis will discuss with Precision, using its best efforts in good faith for up to [***], commercially reasonable terms under which the rights that are the subject of the Precision License Request may

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

be made available to Precision for licensing. However, Cellectis (at its sole discretion and for any reason) may decline to grant the rights requested by Precision under any Precision License Request, and Cellectis is not obligated under any circumstances to grant such rights, and nothing in this Agreement or elsewhere shall be interpreted otherwise.

4.3. Cellectis License Request. From time to time during the Term, if Cellectis desires to obtain exclusive rights under the Licensed Precision Patents to make, have made, use, lease, transfer, sell, offer for sale, export or import Engineered I-Crel Meganucleases or products made using Engineered I-Crel Meganucleases within the Field or any particular field in the Territory, Cellectis shall provide Precision with a written notice requesting a license to Cellectis that would grant such rights to Cellectis (a "**Cellectis License Request**"). Upon Precision's receipt of a Cellectis License Request, provided that Precision has no obligation to a Third Party or under applicable law that would conflict with such Cellectis License Request (e.g., Precision has not previously granted rights to a Third Party with respect to the subject matter of the Cellectis License Request that are inconsistent in any way with the rights requested by Cellectis, as determined by Precision), Precision will discuss with Cellectis, using its best efforts in good faith for up to [***], commercially reasonable terms under which the rights that are the subject of the Cellectis License Request may be made available to Cellectis for licensing. However, Precision (at its sole discretion and for any reason) may decline to grant the rights requested by Cellectis under any Cellectis License Request, and Precision is not obligated under any circumstances to grant such rights, and nothing in this Agreement or elsewhere shall be interpreted otherwise.

ARTICLE 5. INTELLECTUAL PROPERTY

5.1. Licensed Cellectis Patents. Cellectis (or its Affiliate, as applicable) will have the sole right and responsibility, at Cellectis' discretion and at Cellectis' expense, to file, prosecute, and maintain Patent protection in the Territory for all Licensed Cellectis Patents.

5.2. Licensed Precision Patents. Precision (or its Affiliate, as applicable) will have the sole right and responsibility, at Precision's discretion and at Precision's expense, to file; prosecute, and maintain Patent protection in the Territory for all Licensed Precision Patents.

5.3. Third Party Infringement of Licensed Cellectis Patents. Cellectis will have the sole and exclusive right (but not the obligation) to initiate an infringement or other appropriate suit (including defense of declaratory judgment actions) in the Territory with respect to infringements or suspected infringements of any of the Licensed Cellectis Patents and to any and all recoveries obtained in connection therewith. Cellectis will have the sole and exclusive right to select counsel for any suit referred to in this Article 5.3 initiated by Cellectis and will pay all expenses of the suit, including attorneys' fees and court costs. Notwithstanding the foregoing, for a period of [***] beginning on the Effective Date, neither Cellectis nor its Affiliates shall initiate any infringement action against any Third Party under the Licensed Cellectis Patents.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

5.4. **Third Party Infringement of Licensed Precision Patents.** Precision will have the sole and exclusive right (but not the obligation) to initiate an infringement or other appropriate suit (including defense of declaratory judgment actions) in the Territory with respect to infringements or suspected infringements of any of the Licensed Precision Patents and to any and all recoveries obtained in connection therewith. Precision will have the sole and exclusive right to select counsel for any suit referred to in this Article 5.4 initiated by Precision and will pay all expenses of the suit, including attorneys' fees and court costs. Notwithstanding the foregoing, for a period of [***] beginning on the Effective Date, neither Precision nor its Affiliates shall initiate any infringement action against any Third Party under the Licensed Precision Patents.

5.5. **Non-Interference with Enforcement Activities.** Without limiting the obligations set forth in the final sentence of Article 5.3 and the final sentence of Article 5.4, Cellectis or Precision (or their Affiliates), as applicable, (the "**Enforcing Party**") shall provide written notice (an "**Intent to Enforce Notice**") to the other Party (the "**Non-Enforcing Party**") at least [***] prior to (i) providing a Third Party (the "**Purported Infringer**") with written notice of infringement of the Licensed Cellectis Patents or Licensed Precision Patents, as applicable, or (ii) commencing any action against a Purported Infringer to enforce the Licensed Cellectis Patents or Licensed Precision Patents, as applicable. Upon receipt of such Intent to Enforce Notice, [***]. For any avoidance of any doubt, a Party may not enforce the other Party's Licensed Patents.

ARTICLE 6. CONFIDENTIALITY

6.1. During the term of this Agreement and for a period of three (3) years following its termination or expiration, the Parties shall keep strictly confidential and not publish, or disclose to any Third Party any of the terms of this Agreement, without the prior written approval of the other Party, provided, however, that either Party may disclose the terms and conditions of this Agreement (a) to the extent such terms must be disclosed in response to a valid order of a court or other governmental body, or are otherwise required to be disclosed by law or regulation (provided, however, in such event that the receiving Party shall first have given reasonable prior notice to the disclosing Party and shall have made a reasonable effort to obtain a protective order requiring that the information so disclosed be limited to information necessarily responsive to the order issued), or (b) to a Third Party bound by an obligation of confidentiality in connection with the Party's merger, consolidation, change of control, sublicense, or sale of all or substantially all of its assets with or to such Third Party, or an equity or debt investment in such Party by such Third Party.

6.2. Notwithstanding the foregoing, the Parties will issue the joint press release set forth on **Exhibit D** concerning the Parties' entry into the Agreement. A Party shall not be required to seek the permission of the other Party to repeat or disclose any information as to the terms of this Agreement that has already been publicly disclosed by such Party in accordance with the foregoing or by the other Party, or any similar or comparable information.

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

ARTICLE 7. WARRANTIES AND INDEMNITY

7.1. Mutual Representations and Warranties. Each Party represents, warrants and covenants to the other Party that:

(a) at the Effective Date it has the full power to enter into this Agreement and to perform its obligations hereunder:

(b) at the Effective Date it is a corporation duly organized, validly existing and in good standing under the laws of its jurisdiction of incorporation;

(c) at the Effective Date the execution, delivery and performance of this Agreement have been duly authorized by all necessary corporate actions of such Party;

(d) at the Effective Date this Agreement constitutes the legal, valid and binding obligation of such Party, enforceable against it in accordance with its terms, subject to (i) laws of general application relating to bankruptcy, insolvency and the relief of debtors, and (ii) rules of law governing specific performance, injunctive relief and other equitable remedies;

(e) at the Effective Date (i) it has never approved or commenced any proceeding, or made any election contemplating, the winding up or cessation of its business or affairs or the assignment of material assets for the benefit of creditors, and no such proceeding is pending or (to its knowledge) threatened; and (ii) no steps have been taken, and no event has occurred, that gives any Third Party a right to enforce any lien or security right over any of the Licensed Patents Controlled by such Party or any of its Affiliates;

(f) at the Effective Date and at all times during the Term it has the full right, power and authority to enter into this Agreement and grant the rights, licenses, releases and immunities granted hereunder, without the need for any licenses, releases, consents, approvals or immunities not yet granted or obtained, and without conflicting with rights granted to any Third Party;

(g) the execution, delivery and performance by it of this Agreement and its compliance with the terms and provisions of this Agreement does not at the Effective Date and will not during the Term (i) conflict with or result in a violation or breach of any of the terms, conditions or provisions of its certificate or articles of incorporation or by-laws (or other comparable corporate charter documents); (ii) conflict with or result in a violation or breach of any term or provision of any law or order applicable to it; or (iii) (A) conflict with or result in a violation or breach of, (B) constitute (with or without notice or lapse of time or both) a default under, (C) require it to obtain any consent, approval or action of, make any filing with or give any notice to any person as a result or under the terms of, or (D) result in the creation or imposition of any lien or other similar interest upon it or any of the Licensed Patents Controlled by such Party or any of its Affiliates under, any contract, instrument or license to which it is a party or by which any of its assets and properties is bound;

(h) at the Effective Date there are no actions, claims, demands, suits, citations, summons, subpoenas, inquiries or investigations of any nature, civil, criminal, regulatory or otherwise, in law or in equity, or arbitral proceedings or any proceedings by or before any governmental authority, pending or, to its knowledge, threatened

against, relating to or affecting it or any of the Licensed Patents Controlled by such Party or any of its Affiliates (with the exception of normal prosecution at the United States Patent and Trademark Office and equivalent foreign patent offices or customary actions with the relevant regulatory authorities) which (A) could reasonably be expected to result in the issuance of an order restraining, enjoining or otherwise prohibiting or making illegal the consummation of any of the transactions contemplated by this Agreement or otherwise result in a diminution of the benefits contemplated by this Agreement to the other Party; or (B) if determined adversely to it, could reasonably be expected to result in any injunction or other equitable relief against it that would interfere in any material respect with its ability to perform its duties and obligations under this Agreement;

(i) at all times during the Term it shall not grant to any Third Party any rights that conflict with the rights and licenses granted to the other Party under this Agreement; and

(j) at all times during the Term it shall promptly notify the other Party in writing upon becoming aware of any actual action, suit or proceeding by any Third Party which, if adversely determined, would have a material adverse effect upon the other Party's rights under this Agreement with respect to the Licensed Patents Controlled by such Party or any of its Affiliates.

7.2. Cellectis Representations, Warranties and Covenants. Cellectis represents, warrants and covenants that:

(a) Cellectis is the owner of the entire right, title and interest in and to the Licensed Cellectis Patents (including the inventions claimed therein);

(b) **Exhibit A** contains a true, complete and accurate list of all Licensed Cellectis Patents Controlled by Cellectis or any of its Affiliates as of the Effective Date (other than patent applications having a priority date prior to the Effective Date that are not yet published), with the understanding that applications listed in **Exhibit A** are subject to ongoing prosecution and possible amendment of claims;

(c) Cellectis and its Affiliates have not assigned, transferred, conveyed or otherwise encumbered its right, title and interest in the Licensed Cellectis Patents in a manner that conflicts with any rights granted to Precision hereunder. Cellectis and its Affiliates have not granted to any Third Party a right to assert or cause to be asserted any claim of infringement based on any of the Licensed Cellectis Patents against a licensee of the Licensed Cellectis Patents (including Precision);

(d) to the best of its knowledge and belief, Cellectis shall at all times operate under this Agreement (including the licenses granted to Cellectis under Licensed Precision Patents) in compliance with all applicable laws and governmental regulations and guidelines;

(e) as of the Effective Date, subject only to the exclusive licenses granted to the Cellectis Exclusive Licensee in the Exclusive Agreement, Cellectis has not granted any exclusive licenses to any Third Party under any of the Licensed Cellectis Patents in the Field; and

(f) Cellectis shall maintain in effect any applicable in-licenses pursuant to which Cellectis or any of its Affiliates Controls any Licensed Cellectis Patents, subject to the terms of any such in-licenses.

7.3. Precision Representations, Warranties and Covenants. Precision represents, warrants and covenants that:

(a) Precision is either the owner of or otherwise Controls the entire right, title and interest in and to the Licensed Precision Patents (including the inventions claimed therein);

(b) **Exhibit B** contains a true, complete and accurate list of all Licensed Precision Patents Controlled by Precision or any of its Affiliates as of the Effective Date (other than patent applications having a priority date prior to the Effective Date that are not yet published), with the understanding that applications listed in **Exhibit B** are subject to ongoing prosecution and possible amendment of claims;

(c) Precision and its Affiliates have not assigned, transferred, conveyed or otherwise encumbered its right, title and interest in the Licensed Precision Patents in a manner that conflicts with any rights granted to Cellectis hereunder. Precision and its Affiliates have not granted to any Third Party a right to assert or cause to be asserted any claim of infringement based on any of the Licensed Precision Patents;

(d) to the best of its knowledge and belief, Precision shall at all times operate under this Agreement (including the licenses granted to Precision under Licensed Cellectis Patents) in compliance with all applicable laws and governmental regulations and guidelines;

(e) as of the Effective Date, Precision has not granted any exclusive licenses to any Third Party under any of the Licensed Precision Patents in the Field; and

(f) Precision shall maintain in effect any applicable in-licenses pursuant to which Precision or any of its Affiliates Controls any Licensed Precision Patents, subject to the terms of any such in-licenses.

7.4. DISCLAIMER. EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN ARTICLES 7.1, 7.2 AND 7.3 OF THIS AGREEMENT. NO PARTY MAKES ANY OTHER REPRESENTATIONS OR WARRANTIES, WHETHER EXPRESS OR IMPLIED, AND ALL SUCH REPRESENTATIONS OR WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED, INCLUDING ANY WARRANTY REGARDING ENGINEERED I-CREI MEGANUCLEASES OR THEIR USE, SAFETY, EFFICACY, OR PERFORMANCE, ANY WARRANTY OF MERCHANTABILITY OR ANY WARRANTY FOR FITNESS FOR ANY PARTICULAR PURPOSE OR A WARRANTY OR REPRESENTATION THAT ANY ACT OR ANYTHING MADE, USED, SOLD, OR OTHERWISE DISPOSED OF UNDER THE LICENSE GRANTED IN THIS AGREEMENT IS OR WILL BE FREE FROM INFRINGEMENT OF PATENTS, COPYRIGHTS, AND OTHER RIGHTS OF THIRD PARTIES OR ANY OTHER EXPRESS OR IMPLIED LEGAL OR CONTRACTUAL WARRANTY.

NEITHER PARTY (INCLUDING ITS AFFILIATES AND SUBLICENSEES) SHALL BE LIABLE UNDER THIS AGREEMENT FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR FOR LOSS OF PROFIT OR LOST REVENUE, EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH

DAMAGES. NOTWITHSTANDING THE FOREGOING, NOTHING IN THIS ARTICLE 7.4 IS INTENDED TO OR SHALL LIMIT OR RESTRICT (A) THE INDEMNIFICATION RIGHTS OF A PARTY OR DAMAGES AVAILABLE FOR A PARTY'S BREACH OF CONFIDENTIALITY OBLIGATIONS IN ARTICLE 6, OR (B) EITHER PARTY'S LIABILITY FOR ITS (OR ITS AFFILIATES') BREACH OF ARTICLE 2, ARTICLE 3 OR THE COVENANTS IN ARTICLES 5.4 OR 5.5, OR (C) EITHER PARTY'S (OR ITS AFFILIATES' OR SUBLICENSEES') LIABILITY FOR INFRINGEMENT (WHETHER DIRECT, PARTIAL OR CONTRIBUTORY INFRINGEMENT OR INDUCEMENT TO INFRINGE), VIOLATION OR MISAPPROPRIATION OF ANY INTELLECTUAL PROPERTY (WHETHER PATENT, TRADE SECRET OR OTHERWISE) CONTROLLED BY THE OTHER PARTY.

7.5. Precision agrees to indemnify Cellectis and its Affiliates, and their respective officers, employees, directors, and agents (the "**Cellectis Indemnitees**") from and against any and all liability, demands, claims, damages and losses actually incurred by a Cellectis Indemnitee arising out of or in connection with any claim, suit, demand, investigation or proceeding brought by a Third Party based on (a) the manufacture, use, sale, or other exploitation of Engineered I-Crel Meganucleases and their derivatives by Precision or its Affiliates, sublicensees, contractors, agents or customers under the licenses granted by Cellectis to Precision in this Agreement, or (b) any breach of any representation, warrant, covenant and/or obligation of Precision in this Agreement. The foregoing indemnification shall not apply to the extent that any liability, demands, claims, damages and losses are due to a breach of any of Cellectis' representations, warranties, covenants and/or obligations under this Agreement.

7.6. Cellectis agrees to indemnify Precision and its Affiliates, and their respective officers, employees, directors, and agents (the "**Precision Indemnitees**") from and against any and all liability, demands, claims, damages and losses actually incurred by a Precision Indemnitee arising out of or in connection with any claim, suit, demand, investigation or proceeding brought by a Third Party based on (a) the manufacture, use, sale, or other exploitation of Engineered I-Crel Meganucleases and their derivatives by Cellectis or its Affiliates, sublicensees, contractors, agents or customers under the licenses granted by Precision to Cellectis in this Agreement, or (b) any breach of any representation, warrant, covenant and/or obligation of Cellectis in this Agreement. The foregoing indemnification shall not apply to the extent that any liability, demands, claims, damages and losses are due to a breach of any of Precision's representations, warranties, covenants and/or obligations under this Agreement.

7.7. The obligation to indemnify pursuant to this Article 7 shall be contingent upon timely notification by the indemnitee to the indemnitor of any claims, suits or service of process; the tender by the indemnitee to the indemnitor of full control over the conduct and disposition of any claim, demand or suit; and reasonable cooperation by the indemnitee in the defense of the claim, demand or suit. No indemnitor will be bound by or liable with respect to any settlement or admission entered or made by any indemnitee without the prior written consent of the indemnitor. The indemnitee will have the right to retain its own counsel to participate in its defense in any proceeding hereunder. The indemnitee shall pay for its own counsel except to the extent it is determined that (a) one or more legal defenses may be available to it which are different from or additional to those available to the indemnitor, or (b) representation of both Parties by the same counsel would be inappropriate due to actual or potential differing interests between them. In any such case and to such extent, the indemnitor shall be responsible to pay for the reasonable costs and expenses of one separate

counsel retained to participate in the defense of the indemnitee, provided that such expenses are otherwise among those covered by the indemnitor's indemnity obligations under this Article 7. Notwithstanding the foregoing, if the indemnitor reasonably believes that any of the exceptions to its obligation of indemnification of the indemnitee set forth in Articles 7.5 or 7.6 may apply, the indemnitor shall promptly notify the indemnitee, which shall then have the right to be represented in any such action or proceeding by separate counsel at the indemnitee's expense; provided, that the indemnitor shall be responsible for payment of such expenses if the indemnitee is ultimately determined to be entitled to indemnification from the indemnitor.

ARTICLE 8. DURATION – TERMINATION

The Agreement shall come into effect at the Effective Date and shall continue for the duration of the Term, unless sooner terminated as provided in Article 8.3 and Article 8.4 hereinafter. Notwithstanding the foregoing, the Agreement shall have no force or effect until such time as the Parties have signed the Settlement Agreement and satisfied the obligations set forth in Article 2 and Article 3 of the Settlement Agreement with respect to the filing the Stipulations of Dismissal and the Stipulation of Dismissal With Prejudice of the Lonza Litigation.

8.1. Either Party may terminate any license granted to it under this Agreement for any reason or no reason, upon thirty (30) days written notice to the other Party.

8.2. Failure by either Party to comply with any of its respective material obligations and conditions contained in this Agreement (including Article 3) shall entitle the other Party to give to the Party in default notice. If such default is not cured within [***] after receipt of such notice by the Party alleged to be in default, the notifying Party shall be entitled (without prejudice of any of its other rights conferred on it by this Agreement) to terminate (a) this Agreement in its entirety, or (b) any or all licenses granted to the Party in default, each by giving a written termination notice, which shall take effect immediately.

The right of either Party to terminate this Agreement or any licenses granted hereunder as set forth in this Article 8.3 shall not be affected in any way by its waiver of, or failure to take action with respect to any previous default.

8.3. If, other than in the Ongoing Proceedings, either Party or one of its Affiliates (the "**Challenging Party**") directly or indirectly commences or participates in any interference, derivation, re-examination, opposition, post-grant review or other form of patent challenge related to the validity, enforceability and/or patentability of, or challenges the validity or enforceability of, any Licensed Patent Controlled by the other Party (the "**Non-Challenging Party**") to this Agreement before any tribunal or patent office, or intentionally provides assistance to a Third Party for any such purposes, except as required by law, then the Non-Challenging Party may terminate this Agreement in its entirety or any or all licenses granted to the Challenging Party under this Agreement immediately upon written notice to the Challenging Party. Notwithstanding anything to the contrary herein, no act or omission committed by a Challenging Party that otherwise would fall within the scope of the immediately preceding sentence shall give rise to a right for the Non-Challenging Party to elect the

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foregoing remedy if such act or omission is an act or omission that is expressly exempted from the prohibitions set forth in Section 3.1 or Section 3.2. For the sake of clarity, notwithstanding the foregoing and without triggering the provisions of this paragraph, a Party may participate as required in an interference proceeding initiated by the USPTO.

8.4. Upon any termination of this Agreement in its entirety, all licenses granted hereunder shall terminate and all rights granted thereunder shall revert to the applicable Licensor. Notwithstanding the foregoing, in the event any Party's license under any Licensed Patent is terminated, other than pursuant to (i) such Party's breach of Article 3, (ii) such Party's voluntary termination of a license pursuant to Article 8.2, or (iii) the operation of Article 8.4, then in each such event the terminating Party shall grant, and hereby grants, effective only in the event of such a termination, to each then-existing (as of the effective date of such termination) Sublicensee (including without limitation the Existing Licensees under the Existing Licenses, as applicable) of the terminated Party's rights hereunder, the right, exercisable by written notice to the terminating Party within [***] after such termination, to obtain a direct license from the terminating Party under the relevant Licensed Patents on terms substantially similar in scope, grant and financial compensation, to those of the sublicense; provided, that (i) such sublicense was properly granted in compliance with the terms of this Agreement, and (ii) the sublicensee is in material compliance with the terms of such sublicense and the applicable provisions of this Agreement.

8.5. Any rights and obligations accrued prior to termination or expiration of this Agreement shall not be affected by such termination or expiration.

8.6. The provisions of Articles 1 (to the extent required to support surviving rights and obligations), 2.2, 2.3, 2.4, 5.1, 5.2, 5.3, 5.4, 6, 7, 8.5, 8.6, 8.7, 9 and 10 shall survive the expiration or termination of this Agreement.

ARTICLE 9. MISCELLANEOUS

9.1. No amendment to this Agreement shall be valid unless embodied in a writing executed by each of the Parties hereto. No waiver of any of the provisions of this Agreement shall be valid unless embodied in a writing executed by the Party against whom the waiver is sought to be enforced.

9.2. This Agreement, together with the Settlement Agreement, constitutes the entire understanding and agreement between the Parties with respect to the subject matter hereof and supersedes all prior agreements, understanding or arrangements, whether written or oral. Notwithstanding the foregoing, the Confidentiality Agreement dated November 16, 2011 and Supplement to Confidentiality Agreement dated September 1, 2012 between Cellectis and Precision shall remain in full force and effect in accordance with its terms.

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9.3. Any notice of communication authorized or required to be given hereunder or for the purpose hereof shall be deemed duly given by either Party if sent by prepaid registered post or by any other method of delivery capable of providing reasonable proof of receipt thereof and sent to the other party hereto, as follows:

If to Cellectis:
Name: [***]
Title: [***]
Address: 8, rue de la Croix Jarry
75013 Paris, France
Email: [***]

If to Precision:
Name: [***]
Title: [***]
Address: 302 East Pettigrew Street
Dibrell Building, Suite A-100
Durham, North Carolina, USA 27701
Email: [***]

9.4. It is expressly agreed that the relationship between the Parties is that of independent contractors and shall not constitute a partnership, franchise, joint venture, agency, employment or other similar relationship. Neither Party shall have any express or implied right or authority to make any statements, representations or commitments of any kind, or to take any action, which shall be binding on the other, without the prior consent of the other Party to do so, with the understanding that each Party has the right to grant sublicenses under the other Party's Licensed Patents pursuant to the terms of this Agreement.

9.5. In performing this Agreement, each Party shall comply with all applicable laws to the best of its knowledge and belief. If any provision of this Agreement is held by any competent authority to be invalid or unenforceable in whole or in part, this Agreement shall continue to be valid as to the other provisions thereof and the remainder of the affected provision; provided that if the absence of such provision causes a material adverse change in either the risks or benefits of this Agreement to either Party, the Parties shall negotiate in good faith a commercially reasonable substitute or replacement for the invalid or unenforceable provision.

9.6. Captions and paragraph headings are for convenience only and shall not form an interpretative part of this Agreement. Unless otherwise specifically provided, all references to an Article incorporate all sections or subsections thereunder. This Agreement has been prepared jointly and shall not be strictly construed against either party hereto. The plural shall be substituted for the singular number in any place in which the context may require such substitution. The word "including" will not be construed as limiting the immediately preceding general term or statement.

9.7. This Agreement may not be assigned by either Party without the prior written consent of the other Party. Notwithstanding the foregoing, such other Party's consent shall not be required for any assignment to an entity that succeeds to all or substantially all of the assigning Party's business or assets relating to this Agreement, whether by sale,

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merger, operation of law or otherwise provided that, in any such event, the intellectual property rights of the acquiring party to such transaction (if other than one of the Parties to this Agreement) shall not be included in the licenses granted hereunder or otherwise be subject to this Agreement. This Agreement shall be binding upon and shall inure to the benefit of the Parties and their respective permitted successors and assigns. In any case, the assignor shall guarantee the compliance of the terms of the Agreement by the assignee. Further, each Party agrees that any assignment of any of the Licensed Patents by either Party shall be subject to the terms and conditions of this Agreement, and no Licensed Patent may be assigned without the simultaneous assignment of this Agreement.

9.8. The Parties will execute and deliver, or cause to be executed or delivered, such further documents and do or cause to be done such further acts and things as may be required to carry out the intent and purpose of this Agreement.

9.9. Except as otherwise provided herein, all legal and other costs and expenses incurred in connection with this Agreement and the transactions contemplated hereby are to be paid by the Party incurring such costs and expenses.

9.10. All written materials, correspondence, technical information, notices and oral assistance supplied by either Party hereto shall be in the English language. The English language version of this Agreement will be controlling on the Parties.

9.11. Except as and to the extent set forth in Article 2.3, this Agreement is solely for the benefit of the Parties and their respective successors and permitted assigns, and no other person or entity has any right, benefit, priority or interest under or because of the existence of this Agreement.

9.12. Precision and Cellectis have each consulted counsel of their choice regarding this Agreement, and each acknowledges and agrees that this Agreement shall not be deemed to have been drafted by one Party or another and shall be construed accordingly.

9.13. Each Party shall ensure that its Affiliates comply with all terms and conditions of this Agreement, including those that are stated to be applicable to such Affiliates, and each Party shall remain responsible and be directly and primarily liable for any non-compliance of its Affiliates with such terms and conditions. Without limiting the foregoing, to the extent that any Affiliate of a Licensee exercises rights under the licenses granted hereunder, the applicable Licensee shall ensure that such Affiliate complies, in relation to such activities, with all covenants and obligations that are imposed on such Licensee under this Agreement.

ARTICLE 10. GOVERNING LAW

This Agreement is acknowledged to have been made in and shall be construed in accordance with the laws of the State of Delaware, U.S.A., without regard to conflict of laws principles which would dictate the application of the law of a different jurisdiction.

ARTICLE 11. DISPUTE SETTLEMENT

11.1. The Parties shall attempt in good faith to settle any disputes between the Parties relative to the interpretation of this Agreement or intellectual property licensed from one Party to the other hereunder. In the event that the Parties fail to resolve a dispute within [***] of written notice of such a dispute from one disputing Party to the other disputing Party, the dispute shall be referred at the written request of either Party to a committee that consists of the Chief Executive Officer or President of Precision and the Chief Executive Officer or President of Cellectis ("**Executive Committee**"). The written request shall contain a description of the dispute, including the factual and legal basis for the Parties' respective positions with respect to the dispute and the relief sought by the Party making the request. The Executive Committee members shall diligently attempt to resolve the dispute, including, if they deem it necessary, meeting directly in order to provide full consideration of the dispute. The Executive Committee members shall have [***] to attempt to do so before any Party can seek to resolve the dispute through the following provisions.

11.2. If the Executive Committee is unable to resolve the dispute within the [***] specified above, then the dispute, at the written request of either Party made within [***] following the end of that [***] period during which the Executive Committee attempted to resolve it, shall be subject to non-binding mediation by a neutral mediator selected by the Parties, with such mediation administered by the International Chamber of Commerce in accordance with its commercial mediation procedures. Any such mediation may be initiated by a Party by written notice (the "**Mediation Notice**") to the other Party specifying the subject of the requested mediation. The dispute shall be mediated by one mediator, to be mutually selected by the Parties. If the Parties fail to agree on the mediator within [***] following the date of the Mediation Notice, then the recommended individuals named by the Parties shall select a third individual to act as the mediator. The mediator shall not be any employee, director, shareholder or agent of any Party or an Affiliate of any Party, or otherwise involved (whether by contract or otherwise) in the affairs of any Party. The mediation shall be conducted in the English language in New York City, New York. The mediation shall be completed within [***] of selection of the mediator. The costs of mediation (exclusive of the expense of a Party in preparing for and participating in the mediation, all of which shall be borne by such Party) shall be shared equally by the Parties.

11.3. All disputes with respect to this Agreement that are not otherwise resolved pursuant to the foregoing Articles 11.1 and 11.2 shall be brought and heard in the federal district court in Delaware, USA, as the sole and exclusive jurisdiction. The Parties agree that none of their communications resulting from Articles 11.1 or 11.2 shall be discoverable or admissible as evidence for any purpose in any such litigation resulting from this paragraph; including any communications of an oral or written nature from a mediator pursuant to Article 11.2. The Parties each consent to the in personam jurisdiction and venue of such courts. The Parties agree that service of process upon them in any such action may be made if delivered in person, by courier service, by telegram, by facsimile or by first class mail, and shall be deemed effectively given upon receipt.

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11.4. Nothing herein shall be construed to prevent either Party from obtaining, in case of urgency, equitable relief, including injunction or specific performance, in the event of a breach or threatened breach of the provisions of this Agreement.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed on their behalf by their respective duly authorized officers.

CELLECTIS SA

By: /s/ André Choulika
Name: André Choulika
Title: Chairman and CEO
Date:

PRECISION BIOSCIENCES, INC.

By: /s/ Matthew Kane
Name: Matthew Kane
Title: CEO
Date: January 23, 2014

Initials PB: /s/ MK

Initials CLS: /s/ AC

Exhibit A:	Licensed Cellectis Patents
Exhibit B:	Licensed Precision Patents
Exhibit C:	Pending Litigations
Exhibit D:	Joint Press Release
Exhibit E:	Ongoing Proceedings
Exhibit F:	Exclusive Field granted to Cellectis Exclusive Licensee

Initials PB: /s/ MK Initials CLS: /s/ AC

Initials PB: /s/ MK

Initials CLS: /s/ AC

EXHIBIT A: LICENSED CELLECTIS PATENTS

TITLE	APPLICATION NUMBER	APPLICATION DATE	PUBLICATION NUMBER	PUBLICATION DATE	GRANT NUMBER	GRANT DATE	
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TITLE	APPLICATION NUMBER	APPLICATION DATE	PUBLICATION NUMBER	PUBLICATION DATE	GRANT NUMBER	GRANT DATE	
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TITLE	APPLICATION NUMBER	APPLICATION DATE	PUBLICATION NUMBER	PUBLICATION DATE	GRANT NUMBER	GRANT DATE	
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TITLE	APPLICATION NUMBER	APPLICATION DATE	PUBLICATION NUMBER	PUBLICATION DATE	GRANT NUMBER	GRANT DATE	
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TITLE	APPLICATION NUMBER	APPLICATION DATE	PUBLICATION NUMBER	PUBLICATION DATE	GRANT NUMBER	GRANT DATE
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[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Initials PB: /s/ MK Initials CLS: /s/ AC

TITLE	APPLICATION NUMBER	APPLICATION DATE	PUBLICATION NUMBER	PUBLICATION DATE	GRANT NUMBER	GRANT DATE
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TITLE	APPLICATION NUMBER	APPLICATION DATE	PUBLICATION NUMBER	PUBLICATION DATE	GRANT NUMBER	GRANT DATE
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[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

EXHIBIT B: LICENSED PRECISION PATENTS

Country	Status	Application Number	Filing Date	Patent Number	Issue Date
[***]	[***]	[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]	[***]	[***]
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[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Country	Status	Application Number	Filing Date	Patent Number	Issue Date
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EXHIBIT C: PENDING LITIGATIONS

Cellectis S.A. v. Precision BioSciences, Inc., No. 5:08-CV-00119-H (E.D.N.C.)

Cellectis S.A. v. Precision BioSciences, Inc. and Precision PlantSciences, Inc., No. 1:11-CV-00173-SLR (D. Del.)

Cellectis S.A. v. Precision BioSciences, Inc., No. 1:11-CV-00890-SLR (D. Del.)

Cellectis S.A. v. Precision BioSciences, Inc., No. 1:12-CV-00204-SLR (D. Del.)

Cellectis S.A. v. Precision BioSciences, Inc., No. 1:12-CV-01662-SLR (D. Del.)

Precision BioSciences, Inc. and Duke University v. Cellectis S.A., Cellectis bioresearch and Cellectis bioresearch Inc., No. 1:13-CV-00247-SLR (D. Del.)

EXHIBIT D: JOINT PRESS RELEASE

PRESS RELEASE

Precision BioSciences and Cellectis SA Announce Cross-License and Settlement Agreement for Gene Editing Technology

Enables Broad Commercialization of Highly Specific Engineered Meganuclease Technology

RESEARCH TRIANGLE PARK, North Carolina, USA and PARIS, France, **January XX, 2014** — Precision BioSciences, Inc. and Cellectis SA (Alternext: ALCLS), today announced that they have reached an agreement to settle patent litigation involving engineered I-CreI meganuclease technology. As part of the settlement, the companies will cross-license certain genome engineering patents and drop their on-going lawsuits and patent challenges. This agreement provides clear freedom to operate for both companies in the engineered I-CreI meganuclease genome engineering field.

Engineered meganucleases are one of the preferred genome engineering technology for most high-value applications. Their small size and exquisite specificity make them safer and easier to deliver than alternative gene editing tools. In addition, current embodiments of the technology are versatile enough to edit any gene in a genome.

“We are pleased to have reached this agreement with our colleagues at Cellectis,” said Matthew Kane, Precision BioSciences’ CEO, “and are very much looking forward to focusing fully on the commercial development of highly needed products utilizing our Directed Nuclease Editor genome engineering technology.”

“This agreement with our colleagues of Precision Biosciences sets the value of innovation of a proven and effective genome engineering tool: meganucleases,” stated Dr. Andre Choulika, Chairman and CEO of Cellectis, “This natural technology has tremendous advantages and has now the full potential to be developed in a number important applications such as agricultural biology and bioproduction.”

About Precision BioSciences

Precision BioSciences’ mission is to continually provide, improve, and enable the world’s most powerful genome engineering technology. Precision’s proprietary *Directed Nuclease Editor*™ (DNE) technology enables the production of genome editing enzymes that can insert, remove, modify, and regulate essentially any gene in mammalian or plant cells.

Initials PB: /s/ MK Initials CLS: /s/ AC

Precision BioSciences' vision is to be the conduit through which the world's greatest genome engineering challenges are solved. Precision has successfully utilized its DNE technology to create innovative products in partnerships with many of the world's largest biopharmaceutical and agbiotech firms. Internally, Precision is developing DNE-based products for biologics manufacturing and human therapeutics. For additional information, please visit www.precisionbiosciences.com.

About Cellectis

Founded in Paris in 1999, Cellectis is a life science group focusing on oncology. We develop next generation T-Cell CAR allogeneic adoptive immunotherapy for leukemia and solid tumors. The strength of our company is based of 14 years of expertise in cell line engineering with a leading TALENT?" based genome-engineering technology and Pulsagile a proprietary vector electroporation system. The Company has a strong partnership with University College London (UCL) on UCART19, the first allogeneic T-Cell CAR technology to enter clinical development in CLL/ALL in 2015. We have also a strong pipeline of products addressing series of liquid and solid tumors. Cellectis' application sectors are human health, agricultural biotechnology, bio-energies and genome customization gene editing tools and services.

Since 2007, Cellectis has been listed on the NYSE Euronext Alternext market (code: ALCLS) in Paris.

For more information, visit our website: www.cellectis.com.

Contacts:

Cellectis: Philippe Valachs, phone: +33 (0)1 81 69 16 00

E-mail: media@cellectis.com

Precision BioSciences: Chelsea Lynam, phone: +1 919 314-5512

E-mail: cheisea.lynam@precisionbiosciences.com

Disclaimer

This press release and the information contained herein do not constitute an offer to sell or subscribe, or a solicitation of an offer to buy or subscribe, for shares in Cellectis in any country.

EXHIBIT E: ONGOING PROCEEDINGS

Reexaminations of Cellectis Owned or Licensed Patents

Reexam Control No. [***]
U.S. Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

Reexam Control No. [***]
U.S Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

Reexam Control No. [***]
U.S. Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

Reexam Control No. [***]
U.S. Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

Reexam Control No. [***]
U.S. Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

Reexam Control No. [***]
U.S. Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

Reexam Control No. [***]
U.S. Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

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Reexaminations of Precision Owned or Licensed Patents

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U.S. Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

Reexam Control No. [***]
U.S. Patent No. [***]
Patent Owner: [***]
Third Party Requester: [***]
Status: [***]

European Oppositions to Cellectis Owned or Licensed Patents

European Patent No. [***]
Proprietor: [***]
Opponent: [***]
Status: [***]

European Patent No. [***]
Proprietor: [***]
Opponent: [***]
Status: [***]

European Patent No. [***]
Proprietor: [***]
Opponent: [***]
Status: [***]

European Oppositions to Precision Owned or Licensed Patents

European Patent No. [***]
Proprietor: [***]
Opponent: [***]
Status: [***]

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EXHIBIT F: EXCLUSIVE FIELD GRANTED TO CELLECTIS EXCLUSIVE LICENSEE

[***]

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Exhibit 10.4

COLLABORATION AND LICENSE AGREEMENT

between

GILEAD SCIENCES, INC.

and

PRECISION BIOSCIENCES, INC.

Dated as of September 10, 2018

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SCHEDULES

COLLABORATION AND LICENSE AGREEMENT

This Collaboration and License Agreement (the "**Agreement**") is made and entered into effective as of September 10, 2018 (the "**Effective Date**") by and between Gilead Sciences, Inc., a corporation organized and existing under the laws of the State of Delaware and having its principal place of business at 333 Lakeside Drive, Foster City, California 94404 ("**Gilead**"), and Precision Biosciences, Inc., a corporation organized and existing under the laws of the State of Delaware and having its principal place of business at 302 East Pettigrew St., Suite A-100, Durham, North Carolina 27701 ("**Precision**"). Gilead and Precision are sometimes referred to herein individually as a "**Party**" and collectively as the "**Parties**."

RECITALS

WHEREAS, Precision has developed a proprietary genome editing platform, the ARCUS Technology (as defined herein), and controls certain intellectual property rights with respect to using the ARCUS Technology to create fully synthetic nucleases derived from homing endonucleases*;*

WHEREAS, Gilead and Precision desire to collaborate on a research and pre-clinical development program to construct, optimize and develop one or more gene editing therapy(ies) that incorporates or otherwise uses one or more nucleases made using the ARCUS Technology and that targets the hepatitis B virus DNA, as further described below, in accordance with the terms and conditions set forth below; and

WHEREAS, following the end of the collaboration, Gilead wishes to assume sole responsibility for the development and commercialization of such gene editing therapies and products containing such gene editing therapies, as further described below, in accordance with the terms and conditions set forth below.

NOW, THEREFORE, in consideration of the premises and the mutual promises and conditions hereinafter set forth, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties, intending to be legally bound, do hereby agree as follows:

ARTICLE 1
DEFINITIONS

Unless otherwise specifically provided herein, the following terms shall have the following meanings:

1.1 "**Acquirer**" means, with respect to a Party, collectively (a) any Third Party that acquires a Party after the Effective Date (whether by transfer or sale of all or any portion of such Party's assets, equity or business, or by a Change of Control or similar business combination transaction or otherwise) and (b) the Affiliates of such Third Party, but excluding such Party and such Party's Affiliates existing immediately prior to the closing of such acquisition of such Party.

1.2 "**Act**" means the United States Federal Food, Drug, and Cosmetic Act, as amended, and the rules, regulations, guidelines, guidance documents and requirements promulgated thereunder, as may be in effect from time to time.

1.3 "**Action**" means any claim or threatened claim, action, suit, arbitration, inquiry, audit, proceeding or investigation (including any investigation by, before or otherwise involving any governmental authority or Regulatory Authority).

1.4 "**Active Component**" means a component that confers a therapeutic effect on a standalone basis or on an incremental or synergistic basis, excluding, for clarity and without limitation, [***] and compounds that potentiate nucleases but which themselves do not confer a therapeutic effect on such basis.

1.5 "**Affiliate**" means, with respect to any Person, any other Person that directly or indirectly Controls, is directly or indirectly Controlled by, or is under direct or indirect common Control with, such first Person. For purposes of this definition, a Person shall be deemed, in any event, to Control another Person if it (a) owns or Controls, directly or indirectly, or has the ability to direct or cause the direction or Control of, more than fifty percent (50%) of the voting equity of such other Person, or (b) has the ability to direct, cause the direction of or Control the management or policies of such other Person, whether through direct or indirect ownership of voting equity, by contract or otherwise.

1.6 "**Affordable Basis**" means sale or other disposition of the Licensed Product by Gilead or its Affiliate or Sublicensee [***].

1.7 "**Agreement**" has the meaning set forth in the preamble hereto.

1.8 "**Alliance Manage**r" has the meaning set forth in Section 2.3.5.

1.9 "**Applicable Law**" means any applicable federal, state, local or foreign constitution, treaty, law, statute, ordinance, rule, regulation, interpretation, guidance document, directive, policy, order, writ, award, decree, injunction, judgment, stay or restraining order of any governmental authority or Regulatory Authority, the terms of any permit, and any other ruling or decision of, agreement with or by, or any other requirement of, any governmental authority or Regulatory Authority having proper jurisdiction over the matter.

1.10 "**ARC Nuclease**" means any fully synthetic nuclease derived from a homing endonuclease and made using the ARCUS Technology.

1.11 "**ARCUS Assigned IP**" [***].

1.12 "**ARCUS IP**" means the ARCUS Technology and the ARCUS Patents.

1.13 "**ARCUS Patents**" means any and all Patents Controlled by Precision or any of its Affiliates as of the Effective Date or at any time during the Term that claim or cover ARCUS Technology, excluding Patents that claim or cover ARCUS Assigned IP.

1.14 "**ARCUS Technology**" means the proprietary genome editing platform Controlled by Precision, known as ARCUS™, relating to the design, creation, selection and optimization of fully synthetic enzymes derived from homing endonucleases, including any modifications or improvements to such platform, excluding ARCUS Assigned IP. For the sake of clarity, ARCUS Technology does not include the sequence(s) (including amino acid sequences and mRNA sequences) of any Gilead ARC Nuclease, the use of any Gilead ARC Nuclease, or the formulation of any Gilead ARC Nuclease or the Licensed Products.

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1.15 "**Bayh-Dole Act**" means the Patent and Trademark Law Amendments Act of 1980, as amended, codified at 35 U.S.C. §§ 200-212, as amended, as well as any regulations promulgated pursuant thereto, including in 37 C.F.R. Part 401.

1.16 [***].

1.17 "**Biosimilar Product**" means, with respect to a Licensed Product in a country or jurisdiction specified below, any product sold by a Third Party that (a)(i) in the United States, is subject to a license by the FDA under Section 351(k) of the PHSA as a product that is "biosimilar" (as defined in Section 351(i)(2) of the PHSA) to, or "interchangeable" (as defined in Section 351(i)(3) of the PHSA) with, such Licensed Product, (ii) in the EU, has been licensed as a similar biological medicinal product by the EMA pursuant to Directive 2001/83/EC, as may be amended, or any subsequent or superseding law, statute or regulation, or (iii) in any country outside the United States and the EU, has received Regulatory Approval in an abbreviated licensure procedure as a biogeneric, biosimilar or interchangeable product from the applicable Regulatory Authority in such country or jurisdiction, in reliance upon the prior Regulatory Approval (or data therein) of such Licensed Product; and (b) is not an Authorized Biosimilar Version of such Licensed Product; where "**Authorized Biosimilar Version**" means any product that (1) is sold under the BLA filed by Gilead or its Affiliate or Sublicensee for such Licensed Product, and (2) is not sold under the product trademark under which such Licensed Product is sold by Gilead, its Affiliate or Sublicensee, as applicable.

1.18 "**BLA**" means Biologics License Application as described in 21 C.F.R §601.2, or equivalent FDA application.

1.19 "**Business Day**" means any day excluding Saturdays, Sundays, December 26 through December 31, and any day that is a legal holiday under the Applicable Laws of the United States or that is a day on which banking institutions located in Durham, North Carolina or San Francisco, California, are authorized or required by Applicable Law or other governmental action to close.

1.20 "**Calendar Quarter**" means each successive period of three (3) calendar months commencing on January 1, April 1, July 1 and October 1, except that the first Calendar Quarter of the Term shall commence on the Effective Date and end on the day immediately prior to the first to occur of January 1, April 1, July 1 or October 1 after the Effective Date, and the last Calendar Quarter shall end on the last day of the Term.

1.21 "**Calendar Year**" means each successive period of twelve (12) calendar months commencing on January 1 and ending on December 31, except that the first Calendar Year of the Term shall commence on the Effective Date and end on December 31 of the year in which the Effective Date occurs and the last Calendar Year of the Term shall commence on January 1 of the year in which the Term ends and end on the last day of the Term.

1.22 "**Cellectis Agreement**" has the meaning set forth in Section 4.6.1.

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1.23 "**Cellectis Patents**" has the meaning set forth in Section 4.6.1.

1.24 "**Change of Control**" means, with respect to a Party, (a) a merger or consolidation of such Party with a Third Party that results in the voting securities of such Party outstanding immediately prior thereto, or any securities into which such voting securities have been converted or exchanged, ceasing to represent at least fifty percent (50%) of the combined voting power of the surviving entity or the parent of the surviving entity immediately after such merger or consolidation, (b) a transaction or series of related transactions in which a Third Party, together with its Affiliates, becomes the beneficial owner of fifty percent (50%) or more of the combined voting power of the outstanding securities of such Party, or (c) the sale or other transfer to a Third Party of all or substantially all of such Party's business. For clarity, an initial public offering of capital stock of Precision that is effected pursuant to a registration statement or an offering statement filed with, and declared effective or qualified, as the case may be, by the Securities and Exchange Commission under the Securities Act of 1933, as amended, shall not in and of itself constitute a Change of Control.

1.25 "**Clinical Studies**" means a Phase I Clinical Study, a Phase II Clinical Study, a Proof of Concept Clinical Study, a Phase III Clinical Study, a Registrational Clinical Study and such other tests and studies in human subjects that are required by Applicable Law, or otherwise recommended by the Regulatory Authorities, to obtain or maintain Regulatory Approvals for a Licensed Product.

1.26 "**COGS**" means in respect of each Licensed Product, [***].

1.27 "**Collaboration Budget**" has the meaning set forth in Section 2.1.3(b).

1.28 "**Collaboration Program**" has the meaning set forth in Section 3.1.

1.29 "**Collaboration R&D Plan**" has the meaning set forth in Section 3.1.

1.30 "**Collaboration Term**" has the meaning set forth in Section 3.1.

1.31 "**Combination Product**" means a Licensed Product that contains one or more Gilead ARC Nuclease(s) as one component as well as one or more other Active Components that do not constitute a Gilead ARC Nuclease, whether co-formulated, co-packaged or otherwise sold together for one price.

1.32 "**Commercially Reasonable Efforts**" means:

1.32.1 with respect to the obligations of a Party under this Agreement relating to Development activities, of a Licensed Product, the level of efforts and expenditure of resources typically devoted in the research-based biopharmaceutical industry by a company to Development, of a product of similar commercial potential at a similar stage in its development or product life, in each case taking into account the Relevant Factors and as measured by the facts and circumstances at the time such efforts are due;

1.32.2 with respect to the level of obligations of a Party under this Agreement relating to other Exploitation activities, the level of efforts and expenditure of resources typically devoted in the research-based biopharmaceutical industry by a company to a

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product of similar market potential at a similar stage in its development or product life, taking into account Relevant Factors and as measured by the facts and circumstances at the time such efforts are due; or

1.32.3 with respect to the obligations of a Party under this Agreement relating to any other objective, reasonable, good-faith efforts typically devoted to similar objectives in the research-based pharmaceutical industry by a company, taking into account industry practices;

provided that, [***].

1.33 "**Competitive Infringement**" means any alleged or threatened infringement of the Precision Patents or Joint Collaboration Program Patents, as applicable, by a Third Party (including alleged or threatened infringement based on the development or commercialization of, or an application to market, a Licensed Product) that is based on the manufacture, use or sale of a Gene Editing Therapy.

1.34 "**Competitive Program**" means [***].

1.35 "**Competitor**" means any Person, other than the Parties and their Affiliates, that is conducting any Competitive Program, for so long as such conduct continues.

1.36 "**Confidential Information**" has the meaning set forth in Section 7.1.

1.37 "**Confidentiality Agreement**" means that certain Mutual Confidential Disclosure Agreement by and between the Parties, dated September 3, 2015.

1.38 "**Control**" means (a) when used with respect to any Person, the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of such entity, whether through the ownership of voting securities, by contract or otherwise, (b) when used with respect to any security, the possession, directly or indirectly, of the power to vote, or to direct the voting of, such security or the power to dispose of, or to direct the disposition of, such security and (c) when used with respect to any item of Information, Regulatory Documentation, material, Patent, or other IP Rights, possession of the right, whether directly or indirectly, and whether by ownership, license or otherwise, to assign or grant a license, sublicense or other right to or under such Information, Regulatory Documentation, material, Patent or other IP Rights to the extent that it does not violate the terms of any written agreement with any Third Party existing as of the date of such assignment or such grant, as applicable; *provided that*, any such Third Party agreement entered into after the Effective Date and requiring additional payment will meet this definition of Control only if such agreement is entered into in compliance with the requirements set forth in Section 5.4.3. "**Controlled**" and "**Controlling**" have corresponding meanings. For clarity, in the case of clause (c), a Person may Control in-licensed IP Rights from a Third Party even if its license to such IP Rights is non-exclusive or otherwise more limited than licenses granted in Sections 4.1 or 4.2, provided that the rights granted under such in-licensed IP Rights will be limited to the extent and scope of the license granted by the licensor Third Party.

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1.39 "**Development**" means all activities related to discovery, identification, research, pre-clinical and other non-clinical testing, test method development and stability testing, toxicology, formulation, process development, manufacturing scale-up, qualification and validation, quality assurance/quality control, clinical studies, including manufacturing in support thereof, statistical analysis and report writing, the preparation and submission of applications for Regulatory Approvals, regulatory affairs with respect to the foregoing and all other activities necessary or reasonably useful or otherwise requested or required by a Regulatory Authority as a condition or in support of obtaining or maintaining a Regulatory Approval. "**Develop**" and "**Developing**" have corresponding meanings.

1.40 "**Dispute**" has the meaning set forth in Section 11.6.

1.41 "**Distributor**" means any person appointed by Gilead or any of its Affiliates or its or their Sublicensees, and that is not an Affiliate of any of them, to distribute, market and sell the Licensed Products in one or more countries in the Territory, in circumstances where the Person purchases its requirements of the Licensed Products from Gilead or its Affiliates or its or their Sublicensees but does not make any royalty or other payment to Gilead or its Affiliates or its or their Sublicensees for (sub)license rights under Precision Know-How or Precision Patents with respect to such Licensed Products.

1.42 "**Divest**" means, as it relates to a Competitive Program: (a) the sale of all right, title and interest in such Competitive Program, including all technology, intellectual property and other assets relating solely thereto, to a Third Party, without the retention or reservation of any rights, license or interest (other than an economic interest such as a right to receive payments) by the selling entity or its Affiliates; or (b) the complete termination and/or shut-down of such Competitive Program such that no technology, intellectual property or other asset solely relating thereto is used by the terminating entity or its Affiliates for the conduct of such Competitive Program.

1.43 "**Dollars**" or "**$**" means United States Dollars.

1.44 "**Duke Agreement**" means the License Agreement entered into by Precision and Duke University ("**Duke**") on April 17, 2006, as amended from time to time.

1.45 "**Duke IP**" means all Patents and Information licensed to Precision under the Duke Agreement that constitute ARCUS Technology. The patent numbers and patent application numbers of the Patents that are included within the Duke IP as of the Effective Date are set forth in Schedule 1.45.

1.46 "**Effective Date**" has the meaning set forth in the preamble hereto.

1.47 "**EMA**" means the European Medicines Agency and any successor agency thereto.

1.48 "**Europe**" means the countries of the European Union as constituted on the Effective Date.

1.49 "**Existing In-License Agreements**" means the Duke Agreement and the Cellectis Agreement.

1.50 "**Exploit**" means to make, have made, import, use, sell, or offer for sale, research, develop, commercialize, register, manufacture, have manufactured, hold, or keep (whether for disposal or otherwise), have used, export, transport, distribute, promote, market, or have sold or otherwise dispose of. "**Exploitation**" and "**Exploiting**" have corresponding meanings.

1.51 "**FDA**" means the United States Food and Drug Administration, or any successor agency thereto.

1.52 "**Field**" means the diagnosis, treatment and prevention of all diseases.

1.53 "**First Commercial Sale**" means, on a Licensed Product-by-Licensed Product and country-by-country basis, the first invoiced commercial sale for monetary value for use or consumption by the general public of a Licensed Product in any country in the Territory after the Marketing Approval for such Licensed Product has been obtained in such country. For the avoidance of doubt, sales prior to receipt of all Marketing Approvals necessary to commence regular commercial sales, such as so-called "named patient sales" and "compassionate use sales", shall not be construed as a First Commercial Sale.

1.54 "**Formulation and Delivery Combination Patent**" means a Patent that includes a use in combination claim that covers the use of an ARC Nuclease in combination with a formulation or [***] developed by either Party outside the Collaboration Program.

1.55 "**FTE**" has the meaning set forth in the definition of "**FTE Rate**."

1.56 "**FTE Rate**" means a rate of [***] based on a total of [***] of work performed by one or more full time employees ("**FTE**"), to be pro-rated on a daily basis if necessary [***]; such rate to be restricted to scientific work and managerial activities related directly to the Collaboration R&D Plan and included in the Collaboration Budget or otherwise provided for in this Agreement. For the avoidance of doubt (a) such rate includes all benefits, travel, and overhead; and (b) in no event shall any one (1) individual be counted as more than one (1) FTE.

1.57 "**GAAP**" means generally accepted accounting principles, as applied in the United States.

1.58 "**Gene Editing Therapy**" means any product that functions through a mechanism of action of targeting, editing, deleting or otherwise modifying an HBV Target.

1.59 "**Generally Applicable Utility**" means, with respect to any Patent or Information, that the utility of such Patent or Information is not limited to (a) the field of HBV, (b) any Gilead ARC Nuclease, or (c) any Active Component contained in a Licensed Product.

1.60 "**Generic Sublicensee**" means a Sublicensee with respect to which Gilead's sublicense is non-exclusive, is granted in accordance with Gilead's "Developing World Access" program as consistently applied by Gilead to its hepatitis B product lines or, if such program is not active, then in accordance with Gilead's successor program with respect to its hepatitis B product lines and so applied, and is limited to the right to manufacture and sell a generic version of the Licensed Product in a country in which Gilead generally provides services through its "Developing World Access" program, or if such program is not active, then in a country then listed by the World Bank's latest rankings in the "low" and "lower middle" income group or equivalent.

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1.61 "**Gilead**" has the meaning set forth in the preamble hereto.

1.62 "**Gilead ARC Nuclease**" means any ARC Nuclease designed, created, selected or optimized by Precision for Gilead, as disclosed or presented to Gilead pursuant to the Collaboration R&D Plan, [***].

1.63 "**Gilead Dual IP**" means the Gilead Dual Know-How and the Gilead Dual Patents.

1.64 "**Gilead Dual Know-How**" means any and all Information to the extent Controlled by Gilead or its Affiliates that (a) is conceived, discovered, developed or otherwise made by or on behalf of Gilead or its Affiliates or Sublicensees [***] or (b)(i) Gilead or its Affiliates elect to provide or disclose to Precision under this Agreement at any time during the Term other than in the case of this clause (b) [***] and (ii) [***]. For clarity, Gilead Dual Know-How does not include any Patents.

1.65 "**Gilead Dual Patents**" means (a) any and all Patents (i) that claim or cover Gilead Dual Know-How and (ii) to the extent such Patents are Controlled by Gilead or its Affiliates at any time during the Term; and (b) any and all Patents [***].

1.66 "**Gilead Funding Commitment**" has the meaning set forth in Section 5.1.1.

1.67 "**Gilead Know-How**" means any and all Information to the extent Controlled by Gilead or any of its Affiliates at any time during the Term that is necessary for Precision to conduct its Development activities under the Collaboration R&D Plan, excluding Gilead Dual Know-How, ARCUS Assigned IP and Joint Collaboration Program Know-How. For clarity, Gilead Know-How does not include any Patents.

1.68 "**Gilead Patents**" means any and all Patents that claim or cover the Gilead Know-How that are Controlled by Gilead or its Affiliates at any time during the Term.

1.69 "**Grant-Back Right**" has the meaning set forth in Section 4.3.1.

1.70 "**HBV**" means the hepatitis B virus.

1.71 "**HBV Target**" means any HBV DNA, [***].

1.72 "**IND**" means (a) an investigational new drug application filed with the FDA for authorization to commence Clinical Studies and its equivalent in other countries or regulatory jurisdictions, and (b) all supplements and amendments that may be filed with respect to the foregoing.

1.73 "**Indemnification Claim Notice**" has the meaning set forth in Section 9.3.

1.74 "**Indemnified Party**" has the meaning set forth in Section 9.3.

1.75 "**Indemnifying Party**" has the meaning set forth in Section 9.3.

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1.76 "**Information**" means all technical, scientific and other know-how and information, trade secrets, ideas, inventions, discoveries, knowledge, technology, means, methods, processes, practices, formulae, instructions, skills, techniques, procedures, experiences, ideas, designs, drawings, assembly procedures, computer programs, specifications, data, results and other information, including: biological, chemical, pharmacological, toxicological, pharmaceutical, physical and analytical, pre-clinical, clinical, safety, manufacturing and quality control data and information, including study designs and protocols, assays and biological methodology, in each case (whether or not confidential, proprietary, patented or patentable) in written, electronic or any other form now known or hereafter developed.

1.77 "**Initial Term**" has the meaning set forth in Section 3.1.

1.78 "**Initiation**" or "**Initiate**" means, with respect to a Clinical Study, the first dosing of the [***] human subject in such Clinical Study.

1.79 "**IP Assignee"** has the meaning set forth in Section 6.1.5.

1.80 "**IP Assignor"** has the meaning set forth in Section 6.1.5.

1.81 "**IP Rights**" means any and all legal means of establishing rights in and to ideas, inventions, discoveries, Information, data, databases, documentation, reports, materials, writings, designs, computer software, processes, principles, methods, techniques and other information, including Patents, trade secrets, trademarks, service marks, trade names, registered designs, design rights, copyrights (including rights in computer software and database rights) and any rights or property similar to any of the foregoing in any part of the world, whether registered or not, together with the right to apply for the registration of any such rights.

1.82 "**Joint Collaboration Program IP**" means the Joint Collaboration Program Know-How and the Joint Collaboration Program Patents.

1.83 "**Joint Collaboration Program Know-How**" has the meaning set forth in Section 6.1.3(a).

1.84 "**Joint Collaboration Program Patents**" has the meaning set forth in Section 6.1.3(b).

1.85 "**Joint Committee**" means the JSC, the JRDC, or any subcommittee established to carry out the functions of the JSC or JRDC, including the Joint Tech Transfer Team.

1.86 "**Joint Research and Development Committee**" or "**JRDC**" has the meaning set forth in Section 2.2.1.

1.87 "**Joint Steering Committee**" or "**JSC**" has the meaning set forth in Section 2.1.1.

1.88 "**Joint Tech Transfer Team**" or "**JTTT**" means the Subcommittee established by the JSC pursuant to Section 2.1.3(f) to oversee, and provide guidance to the Parties regarding the implementation of the Technology Transfer Plan.

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1.89 "**Knowledge**" means the actual knowledge of Precision's Chief Executive Officer, Chief Science Officer, Vice President of Business Development and Director of Intellectual Property, with internal due inquiry.

1.90 "**Licensed Product**" means any Gene Editing Therapy that incorporates one or more Gilead ARC Nuclease(s), in any and all forms, presentations, delivery systems, dosages, and formulations.

1.91 "**Licensed Product Family**" has the meaning set forth in Section 5.4.2.

1.92 "[***] **In-License Agreements**" means any agreements between Precision or its Affiliates and a Third Party entered into as a Third Party License to [***] subject to Section 5.4.3(b) during the Term, in each case under which Precision has obtained rights to [***] for the Exploitation of the Licensed Products and which are used to Exploit the Licensed Products for Gilead.

1.93 "**Losses**" has the meaning set forth in Section 9.1.

1.94 "**Major Market**" means any of [***].

1.95 "**Manufacture**" and "**Manufacturing**" means all activities related to the manufacture, processing, filling, finishing, packaging, labeling, shipping, and holding of any Licensed Product, including process development, process qualification and validation, scale-up, pre-clinical, clinical and commercial manufacture and analytic development, Licensed Product characterization, stability testing, quality assurance, and quality control.

1.96 "**Marketing Approval**" means, with respect to a Licensed Product for a particular country, the grant of a Regulatory Approval that is required in such country from the competent Regulatory Authority to market and sell such Licensed Product in such country, including a BLA in the United States.

1.97 "**Net Sales**" means [***].

1.98 "**Non-Prosecuting Party**" means the Party that is not the Prosecuting Party.

1.99 "**Other Infringement**" means any alleged or threatened infringement of the Precision Patents or Joint Collaboration Program Patents, as applicable, by a Third Party and such alleged or threatened infringement is not a Competitive Infringement.

1.100 "**Party**" and "**Parties**" has the meaning set forth in the preamble hereto.

1.101 "**Patent Challenge**" has the meaning set forth in Section 5.4.8.

1.102 "**Patent Challenge Criteria**" shall have the meaning set forth in Section 5.4.8.

1.103 "**Patents**" means (a) all national, regional and international patents and patent applications, including provisional patent applications; (b) all patent applications filed from such patents, patent applications or provisional applications or from an application claiming

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priority from either of these, including divisionals, continuations, continuations-in-part, substitutions, provisionals, converted provisionals, and continued prosecution applications; (c) any and all patents that have issued or in the future issue from the foregoing patent applications described in clauses (a) and (b), including utility models, petty patents and design patents and certificates of invention; (d) any and all extensions or restorations by existing or future extension or restoration mechanisms, including revalidations, reissues, re-examinations and extensions (including any supplementary protection certificates and the like) of the foregoing patents or patent applications described in clauses (a), (b), and (c); and (e) any similar rights, including so-called pipeline protection, or any importation, revalidation, confirmation or introduction patent or registration patent or patent of addition to any such foregoing patent applications and patents.

1.104 "**Person**" means an individual, corporation, partnership, limited liability company, joint venture, association, trust, unincorporated organization or other entity or any governmental authority or Regulatory Authority.

1.105 "**Phase I Clinical Study**" means a human clinical trial of any product conducted during Phase 1 of a clinical investigation as defined in 21 C.F.R. 312.21(a) or corresponding foreign regulations.

1.106 "**Phase Ib Clinical Study**" means a Phase I Clinical Study within the HBV patient population that is designed to establish an initial indication of efficacy.

1.107 "**Phase II Clinical Study**" means a human clinical trial of any product conducted during Phase 2 of a clinical investigation as defined in 21 C.F.R. 312.21(b) or corresponding foreign regulations, including any such trial conducted as an open label clinical trial.

1.108 "**Phase III Clinical Study**" means a human clinical trial of any product on sufficient numbers of patients that is designed to demonstrate statistically that such product is safe and efficacious for its intended use and to define warnings, precautions and adverse reactions that are associated with such product in the dosage range to be prescribed, as described in 21 C.F.R. 312.21(c) or corresponding foreign regulations, and that is intended to support Marketing Approval of such product.

1.109 "**PHSA**" means the United States Public Health Service Act, as may be amended, or any subsequent or superseding law, statute or regulation.

1.110 [***].

1.111 "**Precision**" has the meaning set forth in the preamble hereto.

1.112 "**Precision Existing Patents**" means the Patents listed in Schedule 1.112.

1.113 "**Precision HBV Patents**" means any Precision Patent that, without expanding the definition of Precision Patents, [***], including the Patents listed in Schedule 1.113, as such schedule may be updated by Precision during the Term in accordance with this Agreement.

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1.114 "**Precision IP**" means the Precision Know-How, the Precision Patents and, to the extent not included in the Precision Know-How and the Precision Patents, the ARCUS Assigned IP.

1.115 "**Precision Know-How**" means any and all Information to the extent Controlled by Precision or any of its Affiliates: (a) as of the Effective Date or at any time during the Collaboration Term and resulting from the conduct of the Collaboration Program, in each case that is necessary or reasonably useful for the Exploitation of any Licensed Product or any Gilead ARC Nuclease, or (b) at any time during the Term that Precision or its Affiliates elect to provide or disclose to Gilead under this Agreement, that is necessary or reasonably useful for the Exploitation of any Licensed Product or any Gilead ARC Nuclease; and in each case ((a) and (b)) excluding Joint Collaboration Program Know-How, ARCUS Technology, and any [***]. For clarity, Precision Know-How does not include any Patents.

1.116 "**Precision Patents**" means any and all Patents to the extent Controlled by Precision or any of its Affiliates (a) as of the Effective Date or at any time during the Collaboration Term and resulting from the conduct of the Collaboration Program, in each case that are necessary or reasonably useful for the Exploitation of any Licensed Product or any Gilead ARC Nuclease; (b) at any time during the Term that cover or claim Precision Know-How; or (c) at any time during the Term that cover or claim any Licensed Product or Gilead ARC Nuclease or are necessary for the Exploitation of Licensed Products or Gilead ARC Nucleases, in the case of Licensed Products under this clause (c) in the form in which such Licensed Products exist as of the end of the Collaboration Term (and including any Regulatory Authority-required modifications made thereto after the Collaboration Term) and in any form supplied under the Supply Agreement but excluding in all cases of clause (c) any Patents that claim or cover any formulation or [***] developed or in-licensed by Precision or its Affiliates after the Effective Date outside the Collaboration Program unless such Patent is a Formulation and Delivery Combination Patent, in which case only claims that cover the use, composition or production of such formulation or [***] apart from the combination shall be excluded; and in each of cases (a) through (c), including the Precision Existing Patents, but excluding any Joint Collaboration Program Patents, ARCUS Patents and any [***].

1.117 "**Proof of Concept Clinical Study**" [***].

1.118 "**Prosecuting Party**" means the Party preparing, filing, prosecuting, maintaining, enforcing or defending the relevant Patent(s), as applicable, in exercise of its rights under, and in accordance, with ARTICLE 6.

1.119 "**Publications**" has the meaning set forth in Section 7.5.

1.120 "**Quality Agreement**" has the meaning set forth in Section 3.5.2.

1.121 "**Registrational Clinical Study**" [***].

1.122 "**Regulatory Approval**" means, with respect to any jurisdiction, any and all approvals (including pricing and reimbursement approvals), licenses, registrations or

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authorizations of any Regulatory Authority necessary or useful for the Exploitation of any Licensed Product in such jurisdiction, including, where applicable, (a) IND, Marketing Approval applications and supplements and amendments thereto; (b) Marketing Approvals and pre- and post-Marketing Approval marketing authorizations (including any prerequisite manufacturing approval or authorization related thereto); (c) labeling approval; and (d) technical, medical and scientific licenses.

1.123 "**Regulatory Authority**" means any applicable supra-national, federal, national, regional, state, provincial or local regulatory agencies, departments, bureaus, commissions, councils or other government entities regulating or otherwise having legal authority with respect to the Exploitation of Licensed Products in the Territory.

1.124 "**Regulatory Documentation**" means any and all (a) applications, registrations, licenses, authorizations and approvals (including all Regulatory Approvals), and non-clinical and clinical study authorization applications or notifications (including all supporting files, writings, data, studies and reports) prepared for submission to a Regulatory Authority or research ethics committee with a view to the obtaining or maintaining of any Regulatory Approval, (b) correspondence to or with the FDA or any other Regulatory Authority (including minutes and official contact reports relating to any communications with any Regulatory Authority), (c) pharmacovigilance databases, adverse drug experience reports and associated documents, and investigations of adverse drug experience reports, (d) manufacturing records, and (e) nonclinical, clinical and other data contained or referenced in or supporting any of the foregoing.

1.125 "**Regulatory Exclusivity Period**" means, with respect to each Licensed Product in any country in the Territory, a period of exclusivity (other than Patent exclusivity) granted or afforded by Applicable Law or by a Regulatory Authority in such country that confers exclusive marketing rights with respect to such Licensed Product in such country or prevents another Person from using, referencing or otherwise relying on data supporting the Marketing Approval for such Licensed Product without the prior written consent of the Marketing Approval holder, including regulatory data exclusivity, new chemical entity exclusivity, new use or indication exclusivity, new formulation exclusivity, pediatric exclusivity and orphan drug designations.

1.126 "**Relevant Factors**" means all factors that are relevant to the Development, Manufacture or Exploitation of a product, including its safety and efficacy, product profile, cost to develop, cost and availability of supply, the time required to complete Development, the competitiveness of the marketplace (including the proprietary position and anticipated market share of the product), the patent position with respect to such product (including the ability to obtain or enforce, or have obtained or enforced, such patent rights), the Third Party patent landscape relevant to the product, the regulatory structure involved, the likelihood of regulatory approval, the anticipated or actual profitability of the applicable product and other technical, commercial, legal, scientific, regulatory and medical considerations.

1.127 "**Representatives**" means, with respect to any Person, such Person's directors, officers, managers, employees, counsel, accountants, financial advisors, lenders and other agents and representatives.

1.128 "**Reversion IP**" means any Patents and Know-How that are Controlled by Gilead or any of its Affiliates as of the date of termination of this Agreement (in whole or in part,

and including, for clarity, Patents filed or issued at any later date covering or claiming applicable inventions conceived on or prior to such date) that are necessary for Precision to continue the Development, Manufacture, use or Exploitation of Licensed Products in the form existing as of the date of termination of this Agreement (and including any Regulatory Authority-required modifications made thereto after such date), excluding any Patent or Know-How that covers or claims, or in the case of Know-How, relates specifically to, (i) any Active Component of any Licensed Product that is not a Gilead ARC Nuclease or (ii) any use of a Gilead ARC Nuclease in combination with any such other Active Component of such Licensed Product.

1.129 "**Reversion Patents**" means, with respect to any particular Licensed Product, Patents within Reversion IP that come to be Controlled by Gilead or any of its Affiliates as a result of activities conducted, under the Collaboration Program or in connection with this Agreement, [***].

1.130 "**Royalty Term**" means, with respect to each Licensed Product, on a country-by-country basis, the period commencing on the date of First Commercial Sale of such Licensed Product by Gilead, its Affiliate or Sublicensee in such country until [***].

1.131 "**Senior Officer**" means, with respect to Gilead, its Chief Scientific Officer or his or her designee, and with respect to Precision, its Chief Executive Officer or his or her designee.

1.132 "**Subcommittee**" means any Joint Committee other than the JSC.

1.133 "**Sublicensee**" means a Third Party to which Gilead has granted a sublicense under the licenses granted to Gilead hereunder to Exploit a Licensed Product under Section 4.3.1, but excluding Distributors.

1.134 "**Supplied Product**" has the meaning set forth in Section 3.5.1.

1.135 "**Supply Agreement**" has the meaning set forth in Section 3.5.2.

1.136 "**Technology Transfer**" has the meaning set forth in Section 3.6.2.

1.137 "**Technology Transfer Plan**" has the meaning set forth in Section 3.6.2.

1.138 "**Term**" has the meaning set forth in Section 10.1.

1.139 "**Territory**" means all countries and territories of the world.

1.140 "**Third Party**" means any Person other than Gilead, Precision and their respective Affiliates.

1.141 "**Third Party Claims**" has the meaning set forth in Section 9.1.

1.142 "[***]" has the meaning set forth in Section 5.4.3(b).

1.143 "**Third Party License**" has the meaning set forth in Section 5.4.3.

1.144 "**United States**" or "**U.S.**" means the United States of America and its territories and possessions (including the District of Columbia and Puerto Rico).

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1.145 "**Valid Claim**" means (a) a claim of an issued and unexpired Patent included within the Precision Patents or Joint Collaboration Program Patents which has not been abandoned, cancelled or held permanently revoked, unenforceable or invalid by a decision of a court or other governmental agency of competent jurisdiction unappealed within the time allowed for appeal, or which has not been admitted to be invalid or unenforceable through reissue or disclaimer or otherwise; [***].

ARTICLE 2
COLLABORATION MANAGEMENT

2.1 Joint Steering Committee.

2.1.1 **Formation.** Within [***] after the Effective Date, the Parties shall establish a joint steering committee (the "**Joint Steering Committee**" or "**JSC**").

2.1.2 **Membership.** The JSC shall consist of two (2) representatives from each of the Parties, each with the requisite experience and seniority to enable such person to make decisions on behalf of the Parties with respect to the issues falling within the jurisdiction of the JSC. The initial JSC members from each Party are set forth on Schedule 2.1.2. From time to time, each Party may substitute one or more of its representatives to the JSC on written notice to the other Party. Each Party shall select from its representatives a co-chairperson for the JSC. From time to time, each Party may change the representative who will serve as its co-chairperson on written notice to the other Party.

2.1.3 **Specific Responsibilities during the Collaboration Term.** During the Collaboration Term, the JSC shall oversee the Collaboration Program, and shall in particular:

(a) monitor and coordinate the activities of the Parties under the Collaboration Program, including overseeing the JRDC, the JTTT, and any other Subcommittees and facilitating communications between the Parties with respect to the Development of the Licensed Products;

(b) except for the initial budget included in the Collaboration R&D Plan that is to be executed by the Parties contemporaneously with the execution of this Agreement, discuss and facilitate the Parties' agreement on a reasonable budget (the "**Collaboration Budget**") for the tasks to be completed in each six-month period of the Collaboration Term and for any adjustments to such tasks, subject to Section 3.2.4;

(c) approve any amendments to the Collaboration R&D Plan in accordance with Section 3.2.2;

(d) review and discuss each Party's written reports, including the results of the Development activities, provided to the JSC pursuant to Section 3.8.3;

(e) approve subcontractors proposed to be used by Precision for the purposes of performing "material" services (as the term "material" is used in Section 4.3.2) in connection with the Collaboration Program, such approval not to be unreasonably withheld, conditioned or delayed, pursuant to Section 4.3.2;

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(f) establish Subcommittees, including a Joint Tech Transfer Team, as appropriate, to carry out its functions and to establish the rules governing and the responsibilities of the Joint Tech Transfer Team;

(g) resolve disputes that may arise in any Subcommittee;

(h) without limiting clause (g) above, resolve disputes that may arise between the Parties or the JTTT regarding the content of the Technology Transfer Plan;

(i) discuss and consider optimal technologies or methodologies for delivery, Manufacture and administration of Licensed Products, such as [***] and other potential Third Party Licenses pursuant to Section 5.4.3(a), *provided however* that [***], and *provided further* that Precision shall timely (A) provide Gilead through the JSC with such information with respect to any [***] that it intends to in-license from a Third Party in reasonable detail to enable Gilead to understand the reasons for the potential selection of such [***], (B) reasonably respond to Gilead's questions relating thereto and (C) consider in good faith Gilead's feedback with respect to such selection; and

(j) perform such other functions as may be assigned to the JSC hereunder.

2.1.4 **Specific Responsibilities following the Collaboration Term.** The JSC shall automatically be disbanded immediately after the First Commercial Sale of the first Licensed Product. During the period after the Collaboration Term and prior to such First Commercial Sale, the JSC shall serve only (a) as a forum for sharing and discussing information with respect to the Technology Transfer, Manufacture, Development and other Exploitation of the Licensed Products and (b) if the Technology Transfer has not been completed, to resolve disputes between the Parties or the JTTT.

2.2 Joint Research and Development Committee.

2.2.1 **Formation.** Within [***] after the Effective Date, the Parties shall establish a joint research and development committee (the "**Joint Research and Development Committee**" or "**JRDC**"). The JRDC shall consist of two (2) representatives from each of the Parties, each with the requisite experience and seniority to enable such person to make decisions on behalf of the Parties with respect to the issues falling within the jurisdiction of the JRDC. The initial JRDC members from each Party are set forth on Schedule 2.2.1. From time to time, each Party may substitute one or more of its representatives to the JRDC on written notice to the other Party.

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2.2.2 **Specific Responsibilities during the Collaboration Term.** The JRDC shall:

(a) provide guidance to the Parties on the implementation of the Collaboration Program;

(b) propose amendments to the Collaboration R&D Plan to the JSC for its review and approval in accordance with Section 3.2.2;

(c) discuss the Regulatory Documentation prepared by Gilead pursuant to Section 3.7.1(a);

(d) discuss the reports to be provided by Precision pursuant to Section 3.7.1(b), including the chemistry, manufacturing and control (CMC) reports; and

(e) perform such other functions as may be assigned to the JRDC hereunder.

For clarity, the JRDC shall not have the authority to modify the Collaboration R&D Plan.

2.2.3 **Specific Responsibilities after the Collaboration Term and Disbandment**. The JRDC shall be disbanded and have no further responsibilities or authority under this Agreement upon the expiry of the Collaboration Term.

2.3 General Provisions Applicable to Committees.

2.3.1 **Meetings and Minutes.**

(a) Unless otherwise agreed to by the Parties, the JSC shall meet quarterly during every twelve (12) month period after the Effective Date until expiration of the Collaboration Term, and thereafter the JSC shall meet annually until disbanded pursuant to Section 2.1.4, and the JRDC shall meet monthly during every twelve (12) month period after the Effective Date until the expiration of the Collaboration Term; *provided that*, the JSC and the JRDC shall each meet in person once during each such twelve (12) month period after the Effective Date if mutually agreed. The location of such in person meetings shall alternate between locations designated by Gilead and locations designated by Precision.

(b) The Alliance Manager for each Party shall be responsible for calling meetings with notice provided a reasonable time in advance of such meeting. Each Party shall make all proposals for agenda items and shall provide all appropriate information with respect to such proposed items a reasonable time in advance of the applicable meeting; *provided that*, under exigent circumstances requiring input by the Joint Committee, a Party may provide its agenda items to the other Party within a shorter period of time in advance of the meeting, or may propose that there not be a specific agenda for a particular meeting, so long as the other Party consents to such later addition of such agenda items or the absence of a specific agenda for such meeting, such consent not to be unreasonably withheld, conditioned or delayed. At the conclusion of each meeting, the Parties will decide which Party shall prepare and circulate for review and approval of the Parties minutes of each meeting within ten (10) Business Days after the meeting. The Parties shall agree on the minutes of each meeting promptly, but in no event later than thirty (30) days after such meeting.

2.3.2 **Procedural Rules.** Each Joint Committee shall have the right to adopt such standing rules as shall be necessary for its work, to the extent that such rules are not

inconsistent with this Agreement. A quorum of the Joint Committee shall exist whenever there is present at a meeting at least one (1) representative appointed by each Party. Subject to the proviso in Section 2.3.1(a), representatives of the Parties on a Joint Committee may attend a meeting either in person or by telephone, video conference or similar means in which each participant can hear what is said by, and be heard by, the other participants. Representation by proxy shall be allowed. Each Joint Committee shall take action by consensus of the representatives present at a meeting at which a quorum exists, with each Party having a single vote irrespective of the number of representatives of such Party in attendance, or by a written resolution signed by at least one (1) representative appointed by each Party. Employees or consultants of a Party that are not representatives of such Party on a Joint Committee may attend meetings of such Joint Committee with advance written notice to the other Party; *provided*, *however*, that such attendees (a) shall not vote or otherwise participate in the decision-making process of the Joint Committee, and (b) are bound by obligations of confidentiality and non-disclosure equivalent to those set forth in ARTICLE 7.

2.3.3 **Decision-making and Dispute Resolution.** If the JRDC or any other Subcommittee cannot, or does not, reach consensus on an issue arising within the scope of its responsibilities within a period of [***], then either Party may refer the matter to the JSC for resolution and a special meeting of the JSC may be called for such purpose. If during the Collaboration Term, and thereafter for so long as the Technology Transfer has not been completed, the JSC cannot, or does not, reach consensus on an issue, including any dispute arising in the JRDC or a Subcommittee, within a period of [***] after referral to the JSC, then the JSC shall refer such dispute to the Senior Officers for resolution. If such Senior Officers cannot resolve such dispute within [***] of it being referred to them, then, subject to the remaining provisions of this Section 2.3.3, and without limiting Gilead's diligence obligations under Sections 3.3 and 3.4 of this Agreement, Gilead shall have final decision-making authority with respect to such matter; *provided that*, Gilead may not exercise such authority (i) to require Precision to license any particular IP Rights for use in the Collaboration Program beyond those already contemplated herein, (ii) to expand the scope of the Collaboration Program beyond HBV Targets, (iii) to expand the scope of the definition of Precision IP, (iv) to accelerate the timelines for Precision Development activities, (v) to establish or modify the Collaboration Budget (for the avoidance of doubt, this clause (v) shall not be construed to limit Gilead's right to modify the Collaboration R&D Plan in a manner that requires the Parties to agree on a modified Collaboration Budget pursuant to Section 3.2.4), (vi) to modify the Collaboration R&D Plan to add additional activities to the Collaboration R&D Plan that Precision reasonably demonstrates would cause Precision's costs or resources for meeting the work plans and timelines set forth in the Collaboration R&D Plan to exceed the Collaboration Budget or the Gilead Funding Commitment, (vii) to dictate the content of the Technology Transfer Plan, or (viii) to select a [***] other than [***] for any Licensed Product. Notwithstanding the foregoing, subject to the terms of this Agreement, Precision shall have final decision-making authority with respect to: (a) the design, creation, and optimization of ARC Nucleases to be proposed to Gilead as Gilead

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ARC Nucleases other than site selection for the HBV Target, which shall be within Gilead's final decision-making authority; (b) the selection of specific [***] for any Licensed Products for [***] or such substitute [***] selected by the JSC; and (c) the selection of subcontractors for conducting activities assigned to Precision under the Collaboration R&D Plan other than those subcontractors performing "material" services in connection with the Collaboration R&D Plan, which subcontractors shall be subject to approval of the JSC pursuant to Section 4.3.2; *provided however,* that with respect to the foregoing (a), Precision shall timely (A) provide Gilead with such information based on which Precision makes its decisions with respect to such design, creation, and optimization of ARC Nucleases under the Collaboration R&D Plan in reasonable detail to enable Gilead to understand the reasons for such decisions, (B) reasonably respond to Gilead's questions relating thereto and (C) consider in good faith Gilead's feedback with respect to such decisions. Following the Collaboration Term, the JSC shall have no decision-making authority with respect to any matter arising under this Agreement and, for clarity, subject to the terms and conditions of this Agreement (including Section 3.4 and Section 4.5), Gilead shall have sole decision-making authority with respect to any matter relating to the Technology Transfer, Manufacture, Development or Exploitation of the Licensed Products.

2.3.4 **Limitations on Authority.** Each Party shall retain the rights, powers, and discretion granted to it under this Agreement and no such rights, powers, or discretion shall be delegated to or vested in a Joint Committee unless such delegation or vesting of rights is expressly provided for in this Agreement or the Parties expressly so agree in writing. No Joint Committee shall have the power to amend, modify, or waive compliance with this Agreement, which may only be amended or modified as provided in Section 11.10 or compliance with which may only be waived as provided in Section 11.10.

2.3.5 **Alliance Manager.** Each Party shall appoint a person(s) who shall oversee contact between the Parties for all matters between meetings of the Joint Committees and shall have such other responsibilities as the Parties may agree in writing after the Effective Date (each, an "**Alliance Manager**"). Each Party may replace its Alliance Manager at any time by notice in writing to the other Party.

ARTICLE 3
DEVELOPMENT AND REGULATORY

3.1 Collaboration Program. Subject to the terms and conditions of this Agreement, the Parties shall collaborate on a research and pre-clinical program to construct, optimize and develop one or more Gene Editing Therapy(ies) made using the ARCUS Technology that targets the HBV Target (the "**Collaboration Program**") and conduct the Development activities set forth in the collaboration research and development plan described in Section 3.2.1 (such plan, as amended from time to time, the "**Collaboration R&D Plan**"). The Collaboration Program shall commence on the Effective Date and will, unless otherwise mutually agreed by the Parties in writing, continue until the third anniversary of the Effective Date or, if earlier, the later of (a) acceptance by the FDA or other competent foreign Regulatory Authority of [***] of the first IND filing for the first Licensed Product and (b) the satisfactory

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completion (as mutually agreed upon by the Parties) of all tasks and activities required under the Collaboration R&D Plan ("**Initial Term**"); *provided that*, if either (a) or (b) has not occurred by the third anniversary of the Effective Date, Gilead, at its option, may extend the Initial Term (or then-current term, as the case may be) for one or more additional six (6) month periods until such time as the later of (a) and (b) has occurred, by serving a written notice(s) to Precision; *provided that*, Gilead pays to Precision the funding payment for such additional period(s) in accordance with Section 5.1 (the Initial Term together with any such extensions, the "**Collaboration Term**").

3.2 Collaboration R&D Plan.

3.2.1 **Initial Collaboration R&D Plan.** The initial Collaboration R&D Plan as agreed to by the Parties as of the date hereof, including the applicable Collaboration Budget, has been signed and acknowledged by each Party and copies of such signed document have been exchanged between the Parties concurrently with the execution of this Agreement.

3.2.2 **Amendments.** During the Collaboration Term, either Party, directly or through its representatives on the JRDC or the JSC, may propose any amendment to the Collaboration R&D Plan, including in light of changed circumstances, and, if the Collaboration Term is extended pursuant to Section 3.1, the Parties shall update the Collaboration R&D Plan to include such additional period(s). Any and all such amendments or updates shall be subject to approval by the JSC, subject to the dispute resolution procedures set forth in Section 2.3.3.

3.2.3 **Contents.** The Collaboration R&D Plan shall include, without limitation: (a) the Development activities to be conducted by each Party pursuant to the Collaboration Program; (b) Development goals; (c) the estimated timelines for such activities; (d) the anticipated costs of and resources for the Development activities, which shall, with respect to Precision's Development activities under the Collaboration R&D Plan, not exceed the Gilead Funding Commitment and shall reflect the FTE Rate and the payment schedule set forth in Section 5.1.1; and (e) the preliminary design parameters for pre-clinical studies to be performed under the Collaboration R&D Plan.

3.2.4 **Collaboration Budget.** With respect to each six-month period of the Collaboration Term, Precision shall propose to the JSC a Collaboration Budget for the performance of the activities in the Collaboration R&D Plan including required FTEs at the FTE Rate, materials, Third Party services and any other cost items. In addition, Precision will propose to the JSC an update to the Collaboration Budget to reflect any adjustments made to the Collaboration R&D Plan by the JSC; *provided however,* that the first Collaboration Budget shall be included in the initial Collaboration R&D Plan to be executed by the Parties contemporaneously with the execution of this Agreement, as described in Section 3.2.1. The Parties, through the JSC, shall use reasonable efforts to agree promptly on each proposed Collaboration Budget. For the avoidance of doubt, the Collaboration Budget must be mutually agreed by Precision and Gilead prior to conducting the relevant activities in the Collaboration Program and will not be subject to final decision-making authority of either Party under Section 2.3.3.

3.2.5 **Inconsistency.** If the terms of the Collaboration R&D Plan contradict, or create inconsistencies or ambiguities with, the terms of this Agreement, then the terms of this Agreement shall govern.

3.3 Performance of the Collaboration R&D Plan. Precision and Gilead shall each use Commercially Reasonable Efforts to carry out or to cause to be carried out the activities assigned to it under the Collaboration R&D Plan in good scientific manner, in compliance with all Applicable Law and in accordance with the timelines set forth therein, and shall, in particular, use Commercially Reasonable Efforts to perform the activities within the time periods set forth in the Collaboration R&D Plan. In the event of any delay in any payments required under Section 5.1.1 beyond the due date for such payment, and without limiting any right of Precision under Section 10.2, Precision may suspend performance of its activities assigned to it under the Collaboration R&D Plan for so long as such delay continues. Neither Party makes any representation, warranty or guarantee that the Development activities conducted under the Collaboration R&D Plan will be successful or that any particular result will be achieved.

3.4 Development Following Expiry of the Collaboration Term. Following expiry of the Collaboration Term, Gilead, at its sole cost, shall be solely responsible for the Development and other Exploitation of the Licensed Products throughout the Territory. Gilead shall provide to Precision an annual high-level summary (consistent with Section B of Schedule 3.8.3) prepared in good faith of its plans to Develop the Licensed Products. Gilead will use Commercially Reasonable Efforts to Develop and otherwise Exploit a Licensed Product in each of the Major Markets, and to comply with such plans, in accordance with the terms of this Agreement and in compliance with all applicable Laws. If Gilead and its Affiliates and Sublicensees have collectively permanently ceased all Development and other Exploitation of Licensed Products under this Agreement, Gilead shall deliver notice to Precision and such notice will be deemed a termination of this Agreement pursuant to Section 10.3.1.

3.5 Clinical Supply of the Licensed Products.

3.5.1 With respect to any Licensed Product developed under the Collaboration Program and specified in the Supply Agreement (and any such additional Licensed Products as the parties may mutually agree), until the later of the completion of a [***] for a Licensed Product and the completion of the Technology Transfer for such Licensed Product, Precision shall be solely responsible for manufacturing and supplying clinical supplies of such Licensed Product(s) ("**Supplied Product**") for use by or on behalf of Gilead under this Agreement, and thereafter Gilead shall assume all manufacturing and supply activities for such Licensed Product (including, for clarity, commercial manufacture and supply).

3.5.2 Within ninety (90) days of identifying the Gilead ARC Nucleases to be used in any Licensed Product, the Parties shall discuss in good faith and enter into (a) a reasonable and customary supply agreement pursuant to which Precision shall manufacture and supply and Gilead shall purchase Supplied Products incorporating such Gilead ARC Nucleases, for use in Clinical Studies and under which Gilead would purchase clinical requirements of such Licensed Products for a price equal to [***] of COGS (the "**Supply Agreement**") and (b) a reasonable and customary quality agreement that shall set forth the terms and conditions upon which Precision shall conduct its quality activities in connection with such supply (the "**Quality Agreement**"), in each case (a) and (b), in a form reasonably acceptable to Gilead and Precision.

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In the event that by [***] prior to the expected date of the first IND filing for the first Licensed Product the Parties do not mutually agree to the Supply Agreement and the Quality Agreement, Gilead shall have the right to require Precision to conduct an early Technology Transfer to Gilead or its designee so that Gilead or such designee can commence the Manufacture of the Licensed Products.

3.6 Technology Transfer.

3.6.1 Upon Gilead's request, and no later than upon the expiration of the Collaboration Term, Precision shall promptly disclose and transfer to Gilead such Precision Know-How and such Information that Precision Controls under the [***] In-License Agreements or other Third Party Licenses that are licensed to Gilead hereunder as is required pursuant to the Technology Transfer Plan; *provided that*, before the expiration of the Collaboration Term, Gilead shall only receive such Precision Know-How as is necessary or reasonably useful for Gilead to meet its obligations under the Collaboration R&D Plan or as the Parties may otherwise reasonably agree in good faith.

3.6.2 The Parties shall, no later than upon the expiration of the Collaboration Term, agree to a technology transfer plan with reasonable limitations on access to Precision personnel (including reasonable caps on hours of access) and facilities, for the full technology transfer of the Manufacture of the Licensed Products to any facility of Gilead or its designee, approved in advance in writing by Precision (such approval not to be unreasonably withheld, conditioned or delayed, and will not be required for facilities located in [***], including the transfer of all Precision Know-How relating to the Manufacture of the Supplied Products and any such Information that Precision Controls under the [***] In-License Agreements or other Third Party Licenses that may be obtained under this Agreement, in a form reasonably acceptable to the Parties ("**Technology Transfer Plan**"). Any further transfer by Gilead or its designee following the initial Technology Transfer shall be subject to the approval process set forth above in this Section 3.6.2. The Parties agree that ARCUS Technology will not be transferred to Gilead or its designee under this Agreement. Any disputes regarding the content of the Technology Transfer Plan shall be resolved in accordance with Section 2.3.3. Following expiration of the Collaboration Term, Precision shall conduct such technology transfer to Gilead or its designee in accordance with the Technology Transfer Plan (the "**Technology Transfer**"), under the oversight and guidance of the JTTT (if any).

3.6.3 Without limiting the foregoing, for a period of [***] following completion of the Technology Transfer Plan, upon Gilead's request made reasonably in advance of the commencement of anticipated Manufacture by Gilead, Precision shall provide Gilead or its designee with such Precision Know-How relating to the Manufacture of the Supplied Products supplemental to the Technology Transfer Plan (i.e., items inadvertently omitted from the Technology Transfer Plan) as is reasonably necessary for Gilead or its designee to commence the Manufacture of the Licensed Products as permitted by this Agreement and the Supply Agreement. For the avoidance of doubt, Gilead acknowledges that after the [***] period described in this Section 3.6.3, Precision shall have no obligation to provide Gilead any such additional support.

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3.6.4 In the event the Supply Agreement is entered into by the Parties pursuant to Section 3.5.2, the Supply Agreement shall remain in effect until the completion of the Technology Transfer and shall either cover the Parties' respective rights and obligations with respect to the Technology Transfer or the Parties will enter into a separate written technology transfer agreement.

3.6.5 All Technology Transfer responsibilities, costs and expenses of Precision and its Affiliates will be set forth in the Collaboration R&D Plan and Collaboration Budget and considered Development activities funded under Section 5.1.1, except for such activities conducted following filing of an IND for any Licensed Product. For any such post-IND activities, (a) Precision will [***] and (b) [***].

3.7 Regulatory Matters.

3.7.1 **Regulatory Activities.**

(a) As between the Parties, subject to Section 3.7.1(b) and Section 3.7.1(d), Gilead shall be responsible for (i) preparing and filing all Regulatory Documentation, including the IND filing for the first Licensed Product, (ii) obtaining and maintaining all Regulatory Approvals for the Licensed Products and (iii) conducting communications with the Regulatory Authorities for the Licensed Products. Gilead shall prepare and file all clinical Regulatory Documentation under the Collaboration Program, including the first IND filing for the first Licensed Product, in consultation with the JRDC.

(b) As between the Parties, during the Collaboration Term, Precision shall be responsible for preparing all non-clinical and chemistry, manufacturing and control (CMC) reports, in each case, as reasonably required by Gilead, for inclusion in the first IND filing for the first Licensed Products. Precision shall prepare all such reports, and provide Gilead with copies of any such reports, in each case, in a timely manner to permit Gilead to make such IND filing without delay, which shall then be discussed in consultation with the JRDC. Without limiting the foregoing, Precision shall support Gilead as may be reasonably necessary in connection with Gilead's preparation of clinical Regulatory Documentation under the Collaboration Program during the Collaboration Term pursuant to Section 3.7.1(a). The responsibilities, costs and expenses of Precision and its Affiliates under this Section 3.7.1(b) during the Collaboration Term will be set forth in the Collaboration R&D Plan and Collaboration Budget and considered Development activities funded under Section 5.1.1. Thereafter, for any such activities, (i) Precision will [***] and (ii) Gilead shall [***].

(c) All Regulatory Documentation generated under this Agreement, including in the course of conducting the Collaboration Program, shall be owned by Gilead and held in the name of Gilead (or its designee).

(d) Except as otherwise provided in the Supply Agreement or the Quality Agreement, with respect to each Licensed Product (i) Gilead shall have sole

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responsibility for attending all meetings (whether occurring in person, by telephone or other remote means) with applicable Regulatory Authorities; *provided that*, Gilead, where permitted by Applicable Law, shall permit a reasonable number of Precision employees to attend (A) each pre-IND meeting for the Licensed Product, (B) the end of phase 2 meeting for the Licensed Product with the FDA, and (C) any other meeting with FDA or EMA (or other competent Regulatory Authority in the United Kingdom) if such meeting has one or more items on the agenda directed toward the safety or delivery of ARC Nucleases; and (ii) Gilead shall have the sole right and responsibility to correspond with applicable Regulatory Authorities; *provided that*, Gilead, where permitted by Applicable Law, will provide draft communications with the FDA and EMA (or other competent Regulatory Authority in the United Kingdom) to Precision for review and comment to the extent it relates to the Gilead ARC Nuclease, the ARCUS Technology, ARCUS Assigned IP or any [***] to the extent licensed or sublicensed by Precision to Gilead, and will consider Precision's comments in good faith before submitting the communications to the FDA or EMA (or other competent Regulatory Authority in the United Kingdom). If either Party or its Affiliates or subcontractors receive any material written correspondence or other communication from the Regulatory Authorities in the Major Markets regarding (x) in the case of Precision as the Party receiving such correspondence from the Regulatory Authorities, the Licensed Products or any components thereof, or (y) in the case of Gilead as the Party receiving such correspondence from the Regulatory Authorities, the Gilead ARC Nuclease, any [***] in-licensed by Precision or the ARCUS Technology or ARCUS Assigned IP, such Party shall provide the other Party with access to or copies of all such material written or electronic correspondence promptly after its receipt.

3.7.2 **Pharmacovigilance.** To the extent safety reporting is required by Applicable Law, upon the request of either Party, the Parties shall enter into an agreement to cover the exchange of adverse event safety data in a mutually agreed format in order to monitor the safety of the Licensed Products and to meet reporting requirements with any applicable Regulatory Authority.

3.8 Records and JSC Reporting.

3.8.1 Precision shall, and shall ensure that its subcontractors shall, maintain records in sufficient detail and in good scientific manner appropriate for patent and regulatory purposes, and in compliance with Applicable Law, which shall be complete and accurate and shall properly reflect all work done and results achieved in the performance of its Development activities under the Collaboration Program which shall record only such activities and shall not include or be commingled with records of activities outside the scope of this Agreement. Such records shall be retained by Precision for at least [***] after the expiration or termination of this Agreement, or for such longer period as may be required by Applicable Law. Upon the request of Gilead, Precision shall provide copies of the records it has maintained pursuant to this Section 3.8.1 to Gilead. Gilead shall maintain such records and the information disclosed therein in confidence in accordance with ARTICLE 7.

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3.8.2 Gilead shall have the right, during normal business hours and upon reasonable notice not more than twice annually during the Collaboration Term without Precision's consent (not to be unreasonably withheld, conditioned or delayed), to inspect and copy all records of Precision maintained pursuant to Section 3.8.1, which may at Gilead's reasonable request, be at Precision's facilities, or as permitted by Precision's agreements with its subcontractors, at the facilities of any such subcontractor. Gilead shall maintain such records and the information disclosed therein in confidence in accordance with ARTICLE 7.

3.8.3 At each JSC meeting during the Collaboration Term, each Party's members on the JSC shall provide a written report to the JSC of its activities with respect to the Collaboration Program conducted since the last JSC meeting, including a reasonable summary of the results of such activities and the progress of the Collaboration Program. In addition, Precision will provide Gilead with a semi-annual report summarizing its activities under the Collaboration Program, which report shall be in the form set forth on Schedule 3.8.3 and shall include disclosure of Precision Know-How required by Section 6.1.1 that has not been previously disclosed. The JSC may request of a Party any such additional written reports describing its activities with respect to the Collaboration Program, as it determines necessary or useful in its discretion.

3.8.4 Without limiting any other rights of Precision hereunder, in the event a Regulatory Authority requests, in connection with a request to obtain regulatory approval for a product (other than a Licensed Product) containing an ARC Nuclease (other than a Gilead ARC Nuclease) that Precision provide clinical data Controlled by Gilead or any of its Affiliates or Sublicensees relating to (a) the safety of (i) the ARCUS Technology generally, or (ii) ARCUS Assigned IP, or (b) if relevant to such other product, a Gilead ARC Nuclease or its delivery, Precision may request that Gilead provide such information within Gilead's Control (and Gilead will use Commercially Reasonable Efforts to obtain and provide such information from its Sublicensees) to Precision solely for use in response to such Regulatory Authority's request with respect to such other product and Gilead shall promptly provide such information for provision to such Regulatory Authority.

3.8.5 Without limiting any other rights of Gilead hereunder, in the event a Regulatory Authority requests, in connection with a request to obtain Regulatory Approval for a Licensed Product, that Gilead provide clinical data Controlled by Precision or any of its Affiliates or sublicensees relating to (a) the safety of the Gilead ARC Nuclease or its delivery, or (b) if relevant to a Licensed Product, a Gilead ARC Nuclease or its delivery, Gilead may request that Precision provide such information to Gilead solely for use in response to such Regulatory Authority's request with respect to the Licensed Product and Precision shall promptly provide such information within Precision's Control (and will use Commercially Reasonable Efforts to obtain and provide such information from its sublicensees) for provision to such Regulatory Authority.

ARTICLE 4
GRANT OF RIGHTS AND COVENANTS

4.1 Grants to Gilead. Subject to the terms and conditions of this Agreement and continuing unless and until terminated pursuant to ARTICLE 10, Precision hereby grants to Gilead:

4.1.1 a worldwide, royalty-bearing, non-transferable (except pursuant to Section 11.3), exclusive license (or sublicense, as the case may be), with the right to grant sublicenses in accordance with Section 4.3, under the Precision IP, [***] (subject to Section 4.1.3) and Precision's interest in the Joint Collaboration Program IP, to Exploit the Licensed Products (including the Gilead ARC Nucleases incorporated in or for incorporation into a Licensed Product) in the Field in the Territory, including to perform its Development activities under the Collaboration R&D Plan; and

4.1.2 a worldwide, royalty-bearing, non-transferable (except pursuant to Section 11.3), non-exclusive license, with the right to grant sublicenses in accordance with Section 4.3, under the ARCUS IP, to the extent necessary for Gilead to Exploit the Licensed Products (including the Gilead ARC Nucleases incorporated in or for incorporation into a Licensed Product) in the Field in the Territory.

4.1.3 The license under Section 4.1.1 with respect to [***] shall be (A) effective only upon execution of the applicable [***] license granted to Precision, and (B) exclusive solely as between the Parties. Any licenses granted by Precision under Section 4.1.1 under any [***] license are subject to and limited by any limitation, restriction or additional terms set forth in the agreement under which Precision or its Affiliates obtained rights under such [***] license from such Third Party. Precision shall (i) use Commercially Reasonable Efforts to ensure the terms of such license (a) confer IP Rights sufficient to grant the license to Gilead under Section 4.1.1, (b) do not result in any material expansion of Gilead's obligations under this Agreement, and (c) do not require Gilead to make any additional representations or warranties or to provide any additional indemnities materially different from those set forth herein, and (ii) disclose to Gilead in writing all terms of such agreement which materially limit or otherwise materially impact Gilead's rights or obligations with respect to such [***]. In connection with such disclosure of terms, and prior to entering into any such license, Precision shall provide Gilead reasonable opportunities to review and comment on the draft during negotiations of the draft with the applicable Third Party (which may be reasonably redacted by Precision, including to redact provisions relating to financials, IP Rights not relevant to this Agreement, and targets not relevant to this Agreement), reasonably consider any comments made by Gilead and provide to Gilead a copy of the unexecuted final version of such redacted agreement no later than [***]. Upon receipt of such unexecuted final version, Gilead may elect by written notice to Precision to (1) accept inclusion of the IP Rights licensed to Precision under such agreement in the licenses granted to Gilead herein or (2) reject such inclusion in good faith, in which case, for clarity, Gilead may enter into a license for such [***] or similar [***] directly with the applicable licensor in accordance with Section 5.4.3(b). In the event Gilead elects to accept such license entered into by Precision, Gilead shall comply with the terms or obligations, as disclosed to Gilead in writing in such unexecuted final version shared with Gilead pursuant to the above prior to Gilead's election pursuant to the immediately preceding sentence, that Precision is required to impose under any such agreement for [***]. Precision shall make Commercially Reasonable Efforts to ensure that the license rights to [***] will include rights for Gilead to modify or improve such technology. Gilead acknowledges that, notwithstanding Precision making such Commercially Reasonable Efforts, the license rights to [***] may not

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include rights for Gilead to modify or improve such technology, or if such rights are included, such rights may be subject to allocation of IP Rights in such modifications or improvements that differ from those contained in this Agreement. For the sake of clarity, if Gilead has accepted its inclusion as set forth above, upon execution the [***] licensed by Precision under the [***] In-License Agreements will fall within the scope of licenses set forth in Section 4.1.1.

4.2 Grants to Precision. Subject to the terms and conditions of this Agreement, Gilead (on behalf of itself and its Affiliates) hereby grants to Precision:

4.2.1 a worldwide, fully paid-up, royalty-free, non-exclusive license, with the right to grant sublicenses to subcontractors (that have been, if required, approved by Gilead) in accordance with Section 4.3, under the Gilead Dual IP, Gilead Patents and Gilead Know-How (but Gilead shall not be required to disclose any Know-How except as otherwise specifically provided herein), to perform, or have performed by such subcontractors, its Development activities under the Collaboration R&D Plan during the Collaboration Term; and

4.2.2 [***].

4.3 Sublicensing and Subcontracting.

4.3.1 Gilead shall have the right: (a) to grant sublicenses under Section 4.1 through multiple tiers of sublicenses to any Affiliate or Third Party; and (b) to subcontract to any Affiliate or Third Party the performance of any of its obligations under this Agreement. Notwithstanding the foregoing, during the Collaboration Term Gilead shall not grant any sublicenses to a Third Party with respect to any Development of a Licensed Product in or for a Major Market without Precision's prior written consent. Gilead shall provide Precision with written notice of any sublicense under this Agreement within [***] after its execution. [***].

4.3.2 Precision shall have the right: (a) to subcontract any of its Development activities under the Collaboration Program to any Affiliate or Third Party; (b) to grant sublicenses under Section 4.2.1 to its subcontractors; and (c) subject to the last sentence of this Section 4.3.2, to grant sublicenses under Section 4.2.2 through multiple tiers of sublicenses to any Affiliates or Third Parties; *provided however*, Precision shall only subcontract activities or services under the Collaboration Program that are designated as "material" in the Collaboration R&D Plan to a vendor that has not been pre-approved by Gilead in the Collaboration R&D Plan after receiving written consent from Gilead, such consent not to be unreasonably withheld, conditioned or delayed. Precision shall provide Gilead with written notice of any sublicense it grants under any issued or published Patents, or Patents that have otherwise been disclosed to Precision, in each case licensed by Gilead to Precision under Section 4.2.2 within [***] after Precision is aware that it has sublicensed such a Patent of Gilead's. In the event Gilead denies consent for such subcontracting, then if Precision requests a recommendation from Gilead for an alternative subcontractor, Gilead shall provide to Precision the name and contact information of at least one subcontractor approved for the conduct of the applicable activity or service within

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[***] of Precision's request for consent. Notwithstanding anything to the contrary in this Agreement, Precision's right to sublicense under clause (c) above shall be subject to Gilead's prior written consent if [***].

4.3.3 Each sublicense or subcontract agreement entered into by a Party under this Section 4.3 shall be consistent with the applicable terms and conditions of this Agreement, including the confidentiality provisions of ARTICLE 7 and the intellectual property provisions of ARTICLE 6, and the applicable Party shall be fully responsible for any breach of this Agreement by any of its Affiliates, Sublicensees or subcontractors. In addition, to the extent required by the Cellectis Agreement, each sublicense granted by Gilead under any Precision Patent must grant the same scope of rights for all Precision Patents and each sublicense granted by Gilead under any ARCUS Patent must grant the same scope of rights for all ARCUS Patents.

4.4 Retention of Rights. Subject to Section 4.5, Precision retains the right to (a) practice the Precision IP and its interest in the Joint Collaboration Program IP to exercise its rights and perform its obligations under this Agreement (in each case in a manner consistent with this Agreement), including the Collaboration Program, and under any Supply Agreement or Quality Agreement, (b) conduct research related to the ARCUS Technology and ARCUS Assigned IP; and (c) practice and license ARCUS Patents, ARCUS Assigned IP, Precision Patents and Precision Know-How outside the scope of the licenses granted to Gilead under Section 4.1.1. Gilead hereby retains the right to practice all intellectual property licensed by Gilead to Precision under this Agreement for any and all purposes. Except as set forth herein, neither Party shall acquire any license or other intellectual property interest, by implication or otherwise, under or to any trademarks, patents or patent applications, Information, or other IP Rights owned or Controlled by the other Party. Neither Party grants to the other Party any rights, licenses or covenants in or to any IP Rights, whether by implication, estoppel, or otherwise, other than the license rights that are expressly granted under this Agreement. Each Party shall not, and shall not permit any of its Affiliates or Sublicensees to, practice any Patents or Information licensed to it by the other Party outside of the scope of the license granted to it under this Agreement (other than such practices as would be otherwise permitted by applicable safe harbors under Applicable Law). Without limiting the foregoing, nothing in this Agreement shall be deemed to grant Gilead any right to access or receive any ARCUS Technology or any right to design, create, select, or optimize any ARC Nucleases using the ARCUS Technology or to otherwise use the ARCUS Technology as a genome engineering tool. Except as expressly set forth in this Article 4, the foregoing licenses from Precision to Gilead do not include any rights under the ARCUS Patents or ARCUS Technology. Neither Party grants hereunder any rights with respect to other products or therapies with which a Licensed Product may be combined.

4.5 Exclusivity.

4.5.1 The Parties acknowledge both their possession of confidential or proprietary information and the highly competitive nature of the industry in which they operate and, accordingly, agree that, in consideration of entering into this Agreement and the promises contained herein, in the Territory, [***] Precision shall not, during the Term [***] (a) conduct, participate in, or enable or directly fund, [***] other than [***] in accordance with this

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Agreement, or (b) license, authorize, or appoint or otherwise enable any Third Party (other than subcontractors to the extent permitted herein) to engage in any of the activities set forth in clause (a) of this Section 4.5.1. Notwithstanding the foregoing, in no event shall [***] be prohibited or otherwise restricted by this Section 4.5.1 from engaging in, directly or indirectly, or funding or otherwise enabling, [***]. Each Party acknowledges and agrees that (A) this Section 4.5 has been negotiated by the Parties, (B) the geographical and time limitations on activities set forth in this Section 4.5 are reasonable, valid and necessary in light of the Parties' circumstances and necessary for the adequate protection of the business of Exploiting the Licensed Products and (C) [***]. If, notwithstanding the foregoing, a court of competent jurisdiction determines that the restrictions set forth in this Section 4.5 are too broad or otherwise unreasonable under Applicable Law, including with respect to duration, geographic scope or space, the court is hereby requested and authorized by the Parties to revise this Section 4.5 to include the maximum restrictions allowable under Applicable Law.

4.5.2 Notwithstanding anything to the contrary in this Agreement, the restrictions on Precision set forth in Section 4.5.1 shall not apply to any Acquirer of Precision [***].

4.5.3 Notwithstanding Section 4.5.1, [***] acquires a Competitor, continuation of the relevant Competitive Program(s) shall not be a breach of this Agreement; *provided that* (i) [***], and (ii) [***].

4.6 Existing In-License Agreements.

4.6.1 **Cellectis Patents.** Gilead acknowledges and agrees that rights under certain ARCUS Patents and/or Precision Patents are licensed to Precision by Cellectis S.A. (the "**Cellectis Patents**") under that certain Patent Cross-License Agreement between Cellectis S.A. and Precision dated January 23, 2014 (the "**Cellectis Agreement**"), and, notwithstanding any exclusive license granted to Gilead under this Agreement, (a) Cellectis S.A. retains rights under the Cellectis Patents and is not restricted from granting rights to Third Parties under the Cellectis Patents, (b) any licenses and rights granted by Precision to Gilead under the Cellectis Patents are granted only within the permissible scope of sublicenses granted under the Cellectis Agreement, and (c) pursuant to the Cellectis Agreement, Cellectis S.A. retains non-exclusive rights under certain ARCUS Patents and/or Precision Patents identified in the Cellectis Agreement, which may be further sublicensed by Cellectis S.A. without Precision control or consent. Gilead acknowledges and agrees that any exercise of any right by Cellectis S.A, or by any Third Party through Cellectis S.A, under the Cellectis Agreement shall not constitute a breach of this Agreement by Precision.

4.6.2 **Duke IP.** Gilead acknowledges and agrees that any licenses and rights granted by Precision to Gilead under the Duke IP are granted subject to the terms and conditions of the Duke Agreement, including Duke's right to practice under the Duke IP for its own internal, non-commercial, educational, research and clinical purposes, and subject to the rights of the United States Government and applicable limitations under 37 C.F.R. § 401, Public Law 96-517 and Public Law 98-620 resulting from the United States Government's funding of

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research leading to creation of the Duke IP. Without limiting the foregoing, Gilead agrees to comply with any obligations resulting from such government rights with respect to its practice of the Duke IP (if any) under this Agreement. Duke shall be a third party beneficiary of the Agreement to the extent its terms and conditions apply or relate to the Duke IP.

4.7 Preservation of Existing In-License Agreements and [***] **In-License Agreements.** To the extent relating to the Gilead ARC Nucleases or the Licensed Products, Precision shall, and shall procure that its Affiliates shall, maintain all licenses to all [***], including the Existing In-License Agreements and any [***] In-License Agreements, in full force and effect in accordance with their terms and conditions and keep Gilead reasonably informed in this regard. Without limiting the foregoing and Section 5.4.9, Precision shall not (a) commit any acts or permit the occurrence of any omissions that would cause breach or termination of any license to [***], including Existing In-License Agreements or any [***] In-License Agreements or (b) amend or otherwise modify or permit to be amended or modified, any license to [***], including the Existing In-License Agreements or any [***] In-License Agreements, in any way that would prejudice Gilead's rights under this Agreement or its ability to continue to Exploit Licensed Products.

ARTICLE 5
PAYMENTS AND RECORDS

5.1 Payments during the Collaboration Program.

5.1.1 **Payments.** In consideration of Precision's agreement to perform its Development activities under the Collaboration R&D Plan, Gilead shall pay Precision (a) [***] for the first six (6) month period of the Collaboration Term, (b) [***] for the second six (6) month period of the Collaboration Term and (c) [***] for each six month period of the Collaboration Term thereafter (in aggregate, the "**Gilead Funding Commitment**"); *provided that*, (i) if the Collaboration Budget at any time is less than the Gilead Funding Commitment for any six-month period, then Precision shall hold the difference for use later in the Collaboration Term if required based on the Collaboration Budget (i.e. if the Collaboration Budget exceeds the Gilead Funding Commitment for a six month period), and (ii) if the Collaboration Budget at any time exceeds the Gilead Funding Commitment for any six-month period, then after application of any amounts held by Precision under clause (i) Gilead shall pay Precision the difference in the then-current period as an advance from later portions of the Gilead Funding Commitment in the Collaboration Term. For clarity, the aggregate Collaboration Budget for the entire Collaboration Term shall not exceed the aggregate Gilead Funding Commitment without the written consent of both Parties.

5.1.2 **Invoicing.** On the Effective Date, Precision shall issue to Gilead an invoice for the first [***] tranche referred to in Section 5.1.1 and Gilead shall pay such tranche to Precision within [***] of receipt of invoice by Gilead. Thereafter Precision shall issue

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an invoice for each [***] tranche or [***] tranche, as applicable, referred to in Section 5.1.1 at least [***] in advance of the relevant six (6) month period. All invoices described in the immediately preceding sentence or this Section 5.1.2 shall be due within [***] of receipt by Gilead. Invoices shall be in accordance with the template set forth on Schedule 5.1.2.

5.2 Development and Regulatory Milestones.

5.2.1 In partial consideration of the rights granted under this Agreement and subject to Section 5.2.2 below, Gilead shall pay to Precision the following one-time milestone payments after the achievement of the following corresponding milestone events with respect to the first Licensed Product to achieve the applicable milestone in the Territory during the Term. Gilead shall notify Precision in writing no later than [***] following the achievement of a milestone event and shall pay to Precision the milestone payment corresponding to such milestone event [***] of receipt of an invoice from Precision.

Development and Regulatory Milestone Event	Milestone Payment
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
[***]	[***]
Maximum total:	[***]

5.2.2 Each milestone payment in Section 5.2.1 shall be payable only upon the first achievement of such milestone and no amounts shall be due for subsequent or repeated achievements of such milestone, whether for the same or a different Licensed Product. The maximum aggregate amount payable by Gilead pursuant to Section 5.2.1 is [***].

5.3 Commercial Milestones.

5.3.1 In partial consideration of the rights granted hereunder and subject to Section 5.3.2 below, Gilead shall pay to Precision the following one-time milestone payments after the achievement of the following milestone events with respect to the first occurrence of the Licensed Products achieving the milestone in the Territory during the Term (including any wind-down period following the end of the Term). Gilead shall notify Precision in writing no later than [***] following the end of the Calendar Quarter in which the commercial milestone event occurs and shall pay to Precision the milestone payment corresponding to such milestone event within [***] of receipt of an applicable invoice from Precision.

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Commercial Milestone Event	Milestone Payment
The first time aggregate global Net Sales of Licensed Products in a Calendar Year are equal to or greater than [***] and less than [***]	[***]
The first time aggregate global Net Sales of Licensed Products in a Calendar Year are equal to or greater than [***] and less than [***]	[***]
The first time aggregate global Net Sales of Licensed Products in a Calendar Year are equal to or greater than [***] and less than [***]	[***]
The first time aggregate global Net Sales of Licensed Products in a Calendar Year are equal to or greater than [***]	[***]
Maximum total:	[***]

5.3.2 Each milestone payment in Section 5.3.1 shall be payable only once upon the first achievement of such milestone and no amounts shall be due for subsequent or repeated achievements of such milestone. The maximum aggregate amount payable by Gilead pursuant to Section 5.3.1 is [***].

5.3.3 For the avoidance of doubt, for the purposes of this Section 5.3, all Net Sales of Licensed Products shall be aggregated globally for all sales made by Gilead or any of its Affiliates or Sublicensees in any and all forms, presentations, delivery systems, dosages, and formulations for purposes of determining whether the above Net Sales thresholds have been achieved. For clarity, all Licensed Products shall be aggregated for the purposes of this Section 5.3 even if they do not have the same Active Components as one another.

5.4 Royalties.

5.4.1 In partial consideration of the rights granted hereunder and subject to Sections 5.4.2 through 5.4.8, during the applicable Royalty Term, on a Licensed Product-by-Licensed Product and country-by-country basis, Gilead shall pay to Precision royalties on the Net Sales of such Licensed Product at the rates set forth below, as determined by the aggregate annual global Net Sales of all Licensed Products in the Licensed Product Family for such Licensed Product:

Annual Global Net Sales of the Applicable Licensed Product	Royalty Rate
For the portion of Net Sales of such Licensed Product Family in the Territory in any given Calendar Year that is less than [***]	[***]
For the portion of Net Sales of such Licensed Product Family in the Territory in any given Calendar Year that is equal to or greater than [***] and less than [***]	[***]

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Annual Global Net Sales of the Applicable Licensed Product	Royalty Rate
For the portion of Net Sales of such Licensed Product Family in the Territory in any given Calendar Year that is equal to or greater than [***] and less than or equal to [***]	[***]
For the portion of Net Sales of such Licensed Product Family in the Territory in any given Calendar Year that is greater than [***]	[***]

5.4.2 [***]:

5.4.3 **Third Party Licenses.** With respect to the Exploitation of any Licensed Product under this Agreement, and without prejudice to any other right of each Party, Gilead and Precision may obtain licenses from Third Parties for any rights for the Exploitation of any Licensed Product in accordance with the following provisions of this Section 5.4.3 (each, a "**Third Party License**"):

(a) If during the Collaboration Term, either Party considers that a license(s) to additional technology, including [***], or IP Rights of a Third Party are necessary or reasonably useful to Develop, Manufacture or otherwise Exploit a Licensed Product under this Agreement, such Party may refer the matter to the JSC for discussion. If the JSC concludes that such a Third Party License is required or reasonably useful, the Parties shall negotiate in good faith which Party shall enter into the Third Party License and the allocation between the Parties of responsibility for the costs and expenses of obtaining such Third Party License, including any royalty reductions under the payments otherwise payable to Precision under Section 5.4.1. Notwithstanding the foregoing, after the Collaboration Term, if rights to Patents controlled by any Third Party cover or claim the applicable Licensed Product or its Manufacture, then Gilead may negotiate and obtain a Third Party License from such Third Party for Gilead, its Affiliates or Sublicensees to Exploit such Licensed Product in such country in accordance with this Agreement. If, pursuant to this Section 5.4.3(a), Gilead has obtained a Third Party License, and owes a royalty under such Third Party License for sales of a Licensed Product in a particular country, then Gilead shall have the right to reduce the royalty payments otherwise payable to Precision under Section 5.4 based on such sales by up to [***] of such payments under such Third Party License; *provided that*, no royalty payment to Precision for a Licensed Product hereunder shall be reduced, pursuant to this Section 5.4.3(a), to less than [***] of the royalty payment that would otherwise be due to Precision in the absence of a reduction pursuant to this Section 5.4.3(a).

(b) Notwithstanding Section 5.4.3(a) above, Precision shall be responsible for obtaining any licenses from Third Parties to Gilead ARC Nuclease delivery technology, including [***], used in the Collaboration Program in the Licensed Products ("[***]"), [***], and following the execution of any such Third Party License shall notify Gilead promptly of the same. Precision shall not incorporate or use any such [***] in the Manufacture

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of the Licensed Products unless Precision has the right to sublicense such [***] to Gilead consistent with Section 4.1.3 and transfers such [***] to Gilead as set forth in Section 3.6.2. In the event Precision fails to obtain a Third Party License with respect to the [***] that Precision uses in the Collaboration Program in the Licensed Products, or fails to so transfer such [***], or if the terms of such proposed Third Party License as disclosed under Section 4.1.3 are not acceptable to Gilead, then Gilead may do so independently and may in such case [***].

(c) For clarity, to the extent an agreement includes rights with respect to any active therapeutic ingredient, having a different mode of action than the Gilead ARC Nuclease or a different active component than the Gilead ARC Nuclease, it is not a Third Party License.

5.4.4 **No Valid Claim.** In the event that, at the time a Licensed Product is sold in a country, there is no Valid Claim in such country with respect to such Licensed Product and the Regulatory Exclusivity Period has expired in such country with respect to the Licensed Product but the Royalty Term remains in effect, then for the purposes of calculating the royalties owed based on the sale of such Licensed Product in such country under Section 5.4.1 at that time, in such country the royalties that would otherwise be owed and payable under Section 5.4.1 based on such sale shall be reduced by [***]. The calculation of the royalty reduction under this Section 5.4.4 shall be conducted separately for each Licensed Product.

5.4.5 **Biosimilar Products.** On a Licensed Product-by-Licensed Product basis, if in any country in the Territory during the Royalty Term for a Licensed Product a Biosimilar Product launches with respect to such Licensed Product in such country, then the royalties that would otherwise be owed and payable under Section 5.4.1 for the Net Sales of such Licensed Product in such country shall be reduced by [***], from the date of launch of such Biosimilar Product in such country until the end of the Royalty Term for such Licensed Product in such country. In the event that Gilead does not learn of such launch until after royalties are paid, Gilead shall be entitled to such adjustment retroactively to such launch date in the form of a credit against future royalty obligations of Gilead under this Agreement.

5.4.6 **Royalty Floor.** Under no circumstances will the application of the reductions in Section 5.4.3, Section 5.4.4 and Section 5.4.5 together ever result in a reduction of the royalties payable by Gilead to Precision to less than [***] of the amounts specified in Section 5.4.1.

5.4.7 **Compulsory Licensing; Generic Sublicensees.** If a Regulatory Authority requires Gilead or any of its Affiliates or Sublicensees to grant a compulsory license to a Third Party permitting such Third Party to make and sell a Licensed Product in a country in the Territory, or Gilead sublicenses to a Generic Sublicensee, then all amounts received from the compulsory licensee in consideration for grant of the license and received from the Generic Sublicensee in consideration for the sublicense, including any royalties so received, shall be [***]. For the avoidance of doubt, the reductions in Section 5.4.3, Section 5.4.4 and Section 5.4.5 shall not apply to reduce amounts payable to Precision pursuant to this Section 5.4.7.

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5.4.8 **Patent Challenge.** [***]

5.4.9 **Payments under Existing In-License Agreements and** [***] **In-License Agreements.** The Parties acknowledge and agree that, without limiting the right of Gilead to take a license to [***] set forth in Section 5.4.3(b), Precision shall be solely responsible for, and shall promptly discharge, any and all payments payable pursuant to the Existing In-License Agreements and [***] In-License Agreements. Notwithstanding anything in this Agreement to the contrary, in the event Precision terminates any of the Existing In-License Agreements and therefore Gilead enters into a license directly with the licensor or otherwise makes payments pursuant to any of the Existing In-License Agreements in order to maintain its rights as a sublicensee under such Existing In-License Agreement, [***].

5.4.10 **Royalty Payments and Reporting.** Gilead shall calculate all amounts payable to Precision pursuant to Section 5.4.1 at the end of each Calendar Quarter. Gilead shall pay to Precision the royalty amounts due with respect to a given Calendar Quarter within [***] after the end of such Calendar Quarter. Each payment of royalties due to Precision shall be accompanied by a statement of the amount of gross sales and Net Sales (including applicable deductions) of each Licensed Product, in each country of the Territory during the applicable Calendar Quarter (including such amounts expressed in local currency and as converted to Dollars), a calculation of the amount of royalty payment due on such Net Sales for such Calendar Quarter, and details on the determination of incremental royalty rates including the aggregation of Licensed Products into Licensed Product Families.

5.5 Mode of Payment. All payments to Precision under this Agreement shall be made by deposit of Dollars in the requisite amount to the following bank account of Precision or such other account as Precision may from time to time designate by notice to Gilead:

[***]

ACCOUNT NAME: [***]

5.6 Currency. For the purpose of calculating any sums due under, or otherwise reimbursable pursuant to, this Agreement (including the calculation of Net Sales expressed in currencies other than Dollars), Gilead shall convert any amount expressed in a foreign currency into Dollars equivalents using its, its Affiliate's or Sublicensee's standard conversion methodology consistent with GAAP.

5.7 Taxes.

5.7.1 A Party making payments to the other Party under this Agreement shall make such payments without deduction or withholding for taxes except to the extent that any such deduction or withholding is required by Applicable Law in effect at the time of payment.

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5.7.2 Any tax required to be withheld on amounts payable under this Agreement shall promptly be paid by the applicable paying Party on behalf of the other Party to the appropriate governmental authority or Regulatory Authority, and such paying Party shall furnish the other Party with proof of payment of such tax within [***]. Any such tax required to be withheld shall be an expense of and borne by such other Party.

5.7.3 The Parties shall cooperate with respect to all documentation required by any taxing authority or reasonably requested by either Party to secure a reduction in the rate of applicable withholding taxes.

5.7.4 If the applicable paying Party had a duty to withhold taxes in connection with any payment it made to the other Party under this Agreement but such paying Party failed to withhold, and such taxes were assessed against and paid by such paying Party, then the other Party shall indemnify and hold harmless such paying Party from and against such taxes (including interest, but not including any related penalties). If such paying Party makes a claim under this Section 5.7.4, it shall comply with the obligations imposed by Section 5.7.2 as if such paying Party had withheld taxes from a payment to the other Party.

5.7.5 Notwithstanding the foregoing, if Gilead assigns its rights and obligations hereunder to an Affiliate or successor pursuant to Section 11.3, and if such Affiliate or successor shall be required by applicable law to withhold any additional nonrecoverable taxes from or in respect of any amount payable under this Agreement as a result of such assignment, then any such amount payable under this Agreement shall be increased to take into account the additional taxes withheld so that, after making all required withholdings, Precision receives an amount equal to the sum it would have received had no such assignment been made.

5.8 Financial Records. Gilead shall, and shall cause its Affiliates and Sublicensees to, keep complete and accurate books and records pertaining to its gross sales and Net Sales of the Licensed Products, in sufficient detail to calculate all amounts payable hereunder and to verify compliance with its obligations under this Agreement. Such books and records shall be retained by Gilead and its Affiliates and Sublicensee until the later of (a) three (3) years after the end of the period to which such books and records pertain, and (b) the expiration of the applicable tax statute of limitations (or any extensions thereof), or for such longer period as may be required by Applicable Law.

5.9 Audit. At the request of Precision, Gilead shall, and shall cause its Affiliates and Sublicensees to, permit an independent auditor designated by Precision and reasonably acceptable to the Gilead, at reasonable times and upon reasonable notice, to audit the books and records maintained by Gilead pursuant to Section 5.8 to ensure the accuracy of all reports and payments made hereunder. Such examinations may not (a) be conducted for any Calendar Quarter more [***] after the end of such Calendar Quarter, (b) be conducted more than [***] or (c) be repeated for any Calendar Quarter. Except as provided below, the cost of this audit shall be borne by the Precision, unless the audit reveals a variance of more than [***] from

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the reported amounts, in which case Gilead shall bear the cost of the audit. If such audit concludes that (x) the amount Gilead paid to the Precision for a given period exceeded the amount that was payable to Precision, then Precision shall reimburse Gilead for such variance within [***] of the date on which such audit was completed by Precision, or (y) the amount Gilead paid to the Precision for a given period was less than the amount that was payable to Precision, Gilead shall reimburse Precision for such variance within [***] after the date on which such audit is completed by Precision.

5.10 Confidentiality. The auditing party shall treat all information subject to review under Sections 5.8 and 5.9 in accordance with the confidentiality provisions of ARTICLE 7.

ARTICLE 6
INTELLECTUAL PROPERTY

6.1 Ownership of Intellectual Property.

6.1.1 **Ownership of Arising IP; Disclosure.** As between the Parties, subject to Sections 6.1.2 and 6.1.3, each Party shall own and retain all right, title and interest in and to any and all Information that is conceived, discovered, developed or otherwise made by or on behalf of such Party or its Affiliates under this Agreement, and any and all Patents and other IP Rights with respect thereto. Gilead shall promptly disclose to Precision in writing during the Collaboration Term and shall cause its Affiliates and make Commercially Reasonable Efforts to cause its Sublicensees to so disclose during the Collaboration Term, the conception, discovery, development or making of any Gilead Dual Know-How described in clause (a) of the definition of Gilead Dual Know-How, and shall make available to Precision, in the form that Gilead has available (including by providing copies thereof), all such Gilead Dual Know-How in connection with each JSC meeting. During the Collaboration Term, Precision shall disclose to Gilead in writing and shall cause its Affiliates and make Commercially Reasonable Efforts to cause its sublicensees to so disclose, the conception, discovery, development or making of any Precision Know-How described in clause (a) of the definition of Precision Know-How and shall make available to Gilead, in the form that Precision has available (including by providing copies thereof), all such Precision Know-How, in connection with each JSC Meeting and semi-annual report described in Section 3.8.3. Within [***] following the end of the Collaboration Term, each Party shall disclose to the other Party in writing any additional Gilead Dual Know-How or Precision Know-How required to be disclosed by this Section 6.1.1 that has not previously been disclosed pursuant to this Section 6.1.1.

6.1.2 **Ownership of ARCUS Assigned IP;** [***]**.**

(a) [***]

(b) [***]

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6.1.3 **Ownership of Joint Collaboration Program IP.** As between the Parties, each Party shall own an equal, undivided interest in any and all:

(a) Information which is conceived, discovered, developed or otherwise made jointly by or on behalf of Gilead or its Affiliates, on the one hand, and Precision or its Affiliates or subcontractors, on the other hand, in the performance of the Collaboration Program [***] ("**Joint Collaboration Program Know-How**"); and

(b) Patents that claim or cover the Joint Collaboration Program Know-How ("**Joint Collaboration Program Patents**") or any other IP Rights with respect to the Joint Collaboration Program Know-How.

Subject to the license granted under Sections 4.1.1, the Parties' obligations under Section 4.5, and the payment obligations in ARTICLE 5, each Party shall have the right to Exploit the Joint Collaboration Program Know-How and the Joint Collaboration Program Patents without a duty of seeking consent or accounting to the other Party; *provided however,* that [***]. Each Party shall promptly disclose to the other Party in writing and shall cause its Affiliates to so disclose, the conception, discovery, development or making of any Joint Collaboration Program Know-How or Joint Collaboration Program Patents by or on behalf of such Party or its Affiliates and shall make available to the other Party, in whatever form such other Party may reasonably request (including by providing copies thereof), all such Joint Collaboration Program Know-How within ten (10) Business Days of such generation.

6.1.4 **Assignment Obligation.** Each Party shall cause all Persons who perform Collaboration Program activities for such Party, including subcontractors, to be under an obligation to assign their rights in any IP Rights resulting therefrom to such Party, except where Applicable Law requires otherwise and except in the case of governmental, not-for-profit and public institutions which have standard policies against such an assignment (in which case a suitable license, or right to obtain such a license, shall be obtained).

6.1.5 **IP Transfer.** The licenses and other rights granted in this Agreement are intended to be and will be binding on any permitted assignee or other transferee of any right, title, or interest with respect to any IP Rights licensed hereunder. Without limiting the generality of the foregoing, and without limiting anything else in this Agreement, if a Party ("**IP Assignor**") assigns or otherwise transfers any right, title or interest to a Third Party ("**IP Assignee**") with respect to any of the IP Rights licensed by IP Assignor to the other Party hereunder, IP Assignor will cause the IP Assignee to agree in writing that such rights are subject to the licenses and other rights granted under or with respect to such IP Rights pursuant to this Agreement, and such assignment or other transfer shall only be effective if such IP Assignee does so agree.

6.1.6 **United States Law.** The determination of whether information and inventions are conceived, discovered, developed, or otherwise made by a Party for the purpose of allocating proprietary rights (including Patent, copyright or other IP Rights) therein, shall, for purposes of this Agreement, be made in accordance with Applicable Law in the United States as such law exists as of the Effective Date irrespective of where such conception, discovery, development or making occurs.

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6.2 Maintenance and Prosecution of Patents.

6.2.1 **Precision Patents.**

(a) Subject to Section 6.2.4, Precision shall have the first right, but not the obligation, through the use of internal or outside counsel, to prepare, file, prosecute, and maintain the Precision Patents worldwide, at [***] sole cost and expense [***]. Precision shall keep Gilead consulted in a timely fashion with respect to the strategy of such preparation, filing, prosecution and maintenance, and in the event of a disagreement with respect to such strategy in relation to a Precision HBV Patent, Gilead shall have final decision-making authority in accordance with Section 6.2.4 and subject to Section 6.2.5; *provided, however*, that Gilead may relinquish such final decision-making authority with respect thereto, in which case Gilead shall no longer be obligated to pay for such activities with respect to the applicable Patent.

(b) In the event that Precision decides not to prepare, file, prosecute, or maintain a Precision Patent pursuant to Section 6.2.1(a), Precision shall provide reasonable prior written notice to Gilead of such intention (which notice shall, in any event, be given no later than [***] prior to the next deadline for any action that may be taken with respect to such Patent). Gilead shall thereupon have the option, in its sole discretion, to assume the control and direction of the preparation, filing, prosecution, and maintenance of such Patent (unless Precision's decision to allow the lapse of any provisional patent application, or abandonment of any patent application, is intended to be in favor of trade secret protection or in favor of a continuation), at [***] cost and expense. The rights and obligations of the Parties shall not otherwise be affected by such assumption of control by Gilead. For the purpose of this ARTICLE 6, "prosecution" shall include any post-grant proceeding including supplemental examination, post grant review proceeding, inter parties review proceeding, patent interference proceeding, opposition proceeding and re-examination.

(c) Gilead acknowledges and agrees that Precision has no rights or responsibility for preparing, filing, prosecuting or maintaining the Cellectis Patents.

(d) In the event that Precision decides to allow the lapse of any patent application in favor of trade secret protection as described in Section 6.2.1(b) or Section 6.2.2(b), Precision shall first discuss such decision with Gilead in good faith (including the potential strategic rationale for not disclosing Information in patent filings and preserving such Information as a trade secret). If, following such discussion, Precision proceeds with allowing any such lapse, Precision shall [***].

(e) Prior to Precision filing a patent application that would constitute a Precision HBV Patent, [***].

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

6.2.2 **Joint Collaboration Program Patents.**

(a) Precision shall have the first right, but not the obligation, through the use of internal or outside counsel, to prepare, file, prosecute, and maintain the Joint Collaboration Program Patents worldwide, with the cost and expense of such activities to be [***].

(b) In the event that Precision decides not to prepare, file, prosecute, or maintain a Joint Collaboration Program Patent pursuant to Section 6.2.2(a), Precision shall provide reasonable prior written notice to Gilead of such intention (which notice shall, in any event, be given no later than [***] prior to the next deadline for any action that may be taken with respect to such Patent), and Gilead shall thereupon have the option, in its sole discretion, to assume the control and direction of the preparation, filing, prosecution, and maintenance of such Patent (unless Precision's decision to allow the lapse of any provisional patent application, or abandonment of any patent application, is intended to be in favor of trade secret protection or in favor of a continuation), with the cost and expense of such activities to be [***]. In the event Gilead chooses not to assume such control and direction, [***] for the cost and expense of such activities. [***] the costs and expenses of the filing, prosecution, and maintenance of any Joint Collaboration Program Patents shall by so choosing relinquish all ownership rights in such Joint Collaboration Program Patents (but not its license rights) and, [***] all such costs and expenses, then such other Party shall be deemed the sole owner thereof and the relinquishing Party shall assign its interest in such Joint Collaboration Program Patents to such other Party.

6.2.3 **Gilead Dual Patents.**

(a) Gilead shall have the first right, but not the obligation, through the use of internal or outside counsel, to prepare, file, prosecute, maintain and otherwise control the Gilead Dual Patents worldwide, at [***]. Gilead shall provide Precision with notice of the filing of, and a copy of, any patent applications for a Gilead Dual Patent.

(b) In the event that Gilead decides not to prepare, file, prosecute, or maintain a Gilead Dual Patent pursuant to Section 6.2.3(a), Gilead shall provide reasonable prior written notice to Precision of such intention (which notice shall, in any event, be given no later than [***] prior to the next deadline for any action that may be taken with respect to such Gilead Dual Patent), and Precision shall thereupon have the option, in its sole discretion, to assume the control and direction of the preparation, filing, prosecution, and maintenance of a Patent that covers the patentable subject matter of the Gilead Dual Know-How to the extent relating to ARCUS Technology, ARCUS Assigned IP or ARC Nucleases (unless Gilead's decision to allow the lapse of any provisional patent application, or abandonment of any patent application, is intended to be in favor of trade secret protection or in favor of a continuation), at [***]. The rights and obligations of the Parties shall not otherwise be affected by such assumption of control by Precision.

6.2.4 **Cooperation; Precision HBV Patents.** With respect to a Precision Patent, Joint Collaboration Program Patent, or Gilead Dual Patent, the Prosecuting Party shall keep the Non-Prosecuting Party reasonably informed of all steps with regard to such preparation, filing, prosecution, and maintenance, including by providing the Non-Prosecuting

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Party with a copy of material communications to and from any patent authority regarding such Patent, and by providing the drafts to the Non-Prosecuting Party of any material filings or responses to be made to such patent authorities sufficiently in advance of submitting such filings or responses so as to allow for a reasonable opportunity for the Non-Prosecuting Party to review and comment thereon; *provided that*, with respect to the Precision HBV Patents, and subject to Section 6.2.1(a) and Section 6.2.5, Precision shall obtain Gilead's prior written approval for such activities, and in the event of a dispute Gilead shall have the final decision-making authority with respect to such matter. If Gilead does not provide a response within [***] after a request from Precision with respect to a filing or response, approval shall be deemed to have been provided by Gilead. The Prosecuting Party shall consider in good faith any comments of the Non-Prosecuting Party with respect to such drafts of the Prosecuting Party and with respect to strategies for filing and prosecuting the applicable Precision Patent, Joint Collaboration Program Patent or Gilead Dual Patent; *provided that*, with respect to the Precision HBV Patents (subject to Section 6.2.1(a) and Section 6.2.5) and Joint Collaboration Program Patents, Precision shall incorporate any and all good faith comments of Gilead, and with respect to Gilead Dual Patents, Gilead shall consider in good faith any comments provided by Precision. Notwithstanding the foregoing, the Prosecuting Party shall promptly inform the Non-Prosecuting Party of any adversarial patent office proceeding or *sua sponte* filing, including a request for, or filing or declaration of, any interference, opposition, or reexamination relating to the applicable Precision Patents, Joint Collaboration Program Patents or Gilead Dual Patents. The Parties shall thereafter consult and the Prosecuting Party shall consider in good faith all comments, requests and suggestions provided by the Non-Prosecuting Party. Each Party shall provide the other Party all reasonable assistance and cooperation in the patent prosecution efforts under this Section 6.2, including providing any necessary powers of attorney and executing any other required documents or instruments for such prosecution. When a Party assumes the responsibilities for the prosecution and maintenance of a Patent under Section 6.2.1(b), 6.2.2(b) or 6.2.3(b), the other Party shall promptly transfer to such Party the patent prosecution files for such Patent and provide reasonable assistance in the transfer of the prosecution responsibilities. The Party assuming such prosecution and maintenance responsibilities shall have the right to engage its own counsel to do so. In connection with the activities set forth in Section 6.2.1, 6.2.2, and 6.2.3 the Prosecuting Party shall consult with the Non-Prosecuting Party as to the strategy for the prosecution and maintenance of the Precision Patents, Joint Collaboration Program Patents and Gilead Dual Patents, as applicable.

6.2.5 [***].

6.2.6 **Joint Research Agreement.** Each Party shall have the right to make an election under 35 U.S.C. 102(c) when exercising its rights under this ARTICLE 6 without the prior written consent of the other Party; *provided that*, the electing Party shall notify the other Party in advance of any such election and shall consider comments provided by the other Party with respect to such election in good faith. With respect to any such election, the Parties shall coordinate their activities with respect to any submissions, filings, or other activities in support thereof. The Parties acknowledge and agree that this Agreement is a "joint research agreement" as defined in 35 U.S.C. 100(h).

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6.2.7 **Other Maintenance and Prosecution.** Except as set forth in this Section 6.2, neither Party shall have any rights to prepare, file, prosecute or maintain Patents owned or in-licensed by the other Party or its Affiliates.

6.2.8 **Patent Schedules.**

(a) **Precision HBV Patents.** At least [***], Precision shall deliver to Gilead an updated Schedule 1.113 listing the Precision HBV Patents as of the date of such delivery. Such updated Schedule 1.113 shall be incorporated into this Agreement upon receipt by Gilead.

(b) **Schedule of ARCUS Patents and Precision Patents.** Without limiting clause (a), at least every [***] commencing as of the first anniversary of this Agreement, Precision shall deliver to Gilead a Schedule 6.2.8 listing all ARCUS Patents and all Precision Patents, including Precision HBV Patents, as of the date of such delivery. In addition, without limiting clause (a) or limiting the foregoing obligation in this clause (b), within [***] of Precision delivering to Gilead each Gilead ARC Nuclease under this Agreement, Precision shall deliver to Gilead an updated Schedule 6.2.8 which schedule shall list all ARCUS Patents and all Precision Patents, including Precision HBV Patents, as of the date of such delivery. In addition, within [***] of the conclusion of the Collaboration Term, Precision shall deliver to Gilead an updated Schedule 6.2.8, which updated schedule shall list all ARCUS Patents and all Precision Patents, including Precision HBV Patents as of the date of such delivery. Such updated Schedule 6.2.8 shall be incorporated into this Agreement upon receipt by Gilead.

6.3 Enforcement of Patents.

6.3.1 **Precision Patents.**

(a) Each Party shall promptly notify the other Party in writing of any alleged or threatened infringement of the Precision Patents by a Third Party of which such Party becomes aware (including alleged or threatened infringement based on the development or commercialization of, or an application to market, a Licensed Product), subject in each case to any confidentiality obligations of the applicable Party owed to the Third Party who made such Party aware of such infringement. Neither Party shall prosecute any Competitive Infringement of the Precision Patents prior to [***]. Thereafter, Gilead shall have the first right, but not the obligation, to prosecute any Competitive Infringement of the Precision Patents, at [***] cost and expense, and Gilead shall retain control of the prosecution of such suit. At all times, Precision shall have the sole right, but not the obligation, to prosecute any Other Infringement of the Precision Patents at [***] cost and expense, and Precision shall retain control of the prosecution of such suit.

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(b) In the event that Gilead decides not to prosecute any Competitive Infringement of the Precision Patents following [***], Gilead shall provide reasonable prior written notice to Precision of such intention (which notice shall, where reasonably practical, be given no later than [***] prior to the next deadline for any action that may be taken with respect to such Patent), and Precision shall thereupon have the option to assume the control and direction of the prosecution of the Competitive Infringement, at [***] cost and expense; *provided that*, in deciding whether to exercise its option, and in prosecuting such infringement, Precision shall take into consideration Gilead's business reasons for deciding not to prosecute the infringement of such Precision Patent.

(c) In the event a Party prosecutes infringement of a Precision Patent against Competitive Infringement pursuant to this Section 6.3.1, the Non-Prosecuting Party shall have the right to join as a party to such claim, suit, or proceeding and participate with its own counsel at [***] cost and expense; *provided that* the Prosecuting Party shall retain control of the prosecution of such claim, suit, or proceeding. During any such claim, suit, or proceeding, the Prosecuting Party shall: (i) provide the Non-Prosecuting Party with drafts of all official papers and statements (whether written or oral) prior to their submission in such claim, suit, or proceeding, in sufficient time to allow the Non-Prosecuting Party to review, consider and substantively comment thereon; (ii) reasonably consider taking action to incorporate the Non-Prosecuting Party's comments on all such official papers and statements; (iii) allow the Non-Prosecuting Party the opportunity to participate in the preparation of witnesses and other participants in such claim, suit, or proceeding; and (iv) not settle any such claim, suit, or proceeding except in a manner that it believes in good faith is in the best interests of the Licensed Products.

(d) Gilead acknowledges and agrees that (i) Precision has no rights or responsibility for enforcing the Cellectis Patents, and therefore all references to Precision Patents in this Section 6.3.1 shall be deemed to exclude the Cellectis Patents for all purposes, (ii) prior to initiating enforcement actions against a Third Party with respect to certain Precision Patents which were subject to the non-exclusive license granted by Precision to Cellectis S.A. pursuant to the Cellectis Agreement, Precision is required by the Cellectis Agreement to confirm that Cellectis S.A. has not granted a license to such Third Party under such Precision Patents, and Gilead will cooperate with Precision in taking such actions as required by the Cellectis Agreement, and (iii) Duke retains discretion as to whether to become a party plaintiff and has certain rights with respect to enforcement of Patents contained within the Duke IP in the event Precision does not enforce such Patents.

6.3.2 **Joint Collaboration Program Patents.**

(a) Each Party shall promptly notify the other Party in writing of any alleged or threatened infringement of the Joint Collaboration Program Patents by a Third Party of which such Party becomes aware (including alleged or threatened infringement based on the development, commercialization, or an application to market a Licensed Product), subject in

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each case to any confidentiality obligations of the applicable Party owed to the Third Party who made such Party aware of such infringement. Gilead shall have the first right, but not the obligation, to prosecute any Competitive Infringement of the Joint Collaboration Program Patents, at [***] cost and expense, and Precision shall have the first right, but not the obligation, to prosecute any Other Infringement of the Joint Collaboration Program Patents, at [***] cost and expense.

(b) In the event that Gilead decides not to prosecute any Competitive Infringement of the Joint Collaboration Program Patents, Gilead shall provide reasonable prior written notice to Precision of such intention (which notice shall, in any event, be given no later than [***] prior to the next deadline for any action that may be taken with respect to such Patent), and Precision shall thereupon have the option to assume the control and direction of the prosecution of the Competitive Infringement, at [***] cost and expense; *provided that*, in deciding whether to exercise its option, and in prosecuting such Competitive Infringement, Precision shall take into consideration Gilead's business reasons for deciding not to prosecute the infringement of such Joint Collaboration Program Patents.

(c) In the event that Precision decides not to prosecute any Other Infringement of the Joint Collaboration Program Patents, Precision shall provide reasonable prior written notice to Gilead of such intention (which notice shall, where reasonably practical, be given no later than [***] prior to the next deadline for any action that may be taken with respect to such Patent), and Gilead shall thereupon have the option to assume the control and direction of the prosecution of the Other Infringement, at [***] cost and expense; *provided that*, in deciding whether to exercise its option, and in prosecuting such infringement, Gilead shall take into consideration Precision's business reasons for deciding not to prosecute the infringement of such Joint Collaboration Program Patents.

(d) In the event a Party prosecutes infringement of a Joint Collaboration Program Patent pursuant to this Section 6.3.2 and (i) the Prosecuting Party finds it necessary or desirable for the Non-Prosecuting Party to join the Prosecuting Party as a party to any such claim, suit or proceeding, the Non-Prosecuting Party shall, at the Prosecuting Party's request, or (ii) the Non-Prosecuting Party otherwise desires to join such claim, suit or proceeding, the Non-Prosecuting Party shall have the right to, join as a party to such claim, suit or proceeding and participate with its own counsel at [***] cost and expense; *provided that* the Prosecuting Party shall retain control of the prosecution of such claim, suit or proceeding. During any such claim, suit, or proceeding with respect to the Joint Collaboration Program Patents in which the Non-Prosecuting Party has joined pursuant to this Section 6.3.2, the Prosecuting Party shall: (A) provide the Non-Prosecuting Party with drafts of all official papers and statements (whether written or oral) prior to their submission in such claim, suit, or proceeding, in sufficient time to allow the Non-Prosecuting Party to review, consider and substantively comment thereon; (B) reasonably consider taking action to incorporate the Non-Prosecuting Party's comments on all such official papers and statements; and (C) allow the Non-Prosecuting Party the opportunity to participate in the preparation of witnesses and other participants in such claim, suit, or proceeding.

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6.3.3 **Gilead Dual Patents.** Each Party shall promptly notify the other Party in writing of any alleged or threatened infringement of the Gilead Dual Patents by a Third Party of which such Party becomes aware (including alleged or threatened infringement based on the development or commercialization, or an application to market, a Licensed Product or any Licensed Product), subject in each case to any confidentiality obligations of the applicable Party owed to the Third Party who made such Party aware of such infringement. Gilead shall have the right, but not the obligation, to prosecute any such infringement at [***] cost and expense and Gilead shall retain control of the prosecution of such suit. With respect to any such alleged or threatened infringement of the Gilead Dual Patents, if Gilead finds it necessary or desirable for Precision to join Gilead as a party to any such action, Precision shall, at Gilead's request, join as a party to such suit and participate with its own counsel at [***] cost and expense; *provided that*, Gilead shall retain control of the prosecution of such suit.

6.3.4 **Cooperation.** Each Party agrees to cooperate fully with the other Party in any infringement action pursuant to this Section 6.3. Where the Prosecuting Party brings such an action, the Non-Prosecuting Party shall, where necessary, furnish a power of attorney solely for such purpose or shall join in, or be named as a necessary party to, such action. Unless otherwise set forth herein, the Prosecuting Party shall have the right to settle such claim; *provided that*, the Prosecuting Party shall not have the right to settle any Patent infringement litigation under this Section 6.3 in a manner that diminishes or has a material adverse effect on the rights or interest of the Non-Prosecuting Party, or in a manner that imposes any costs or liability on, or involves any admission by, the Non-Prosecuting Party, without the express written consent of the Non-Prosecuting Party. The Prosecuting Party shall provide the Non-Prosecuting Party with copies of all pleadings and other material documents filed with the court and shall consider reasonable input from the Non-Prosecuting Party during the course of the proceedings. In connection with the activities set forth in Sections 6.3.1 and 6.3.2, the Prosecuting Party shall consult with the Non-Prosecuting Party as to the strategy for the enforcement of the Precision Patents against a Competitive Infringement and Joint Collaboration Program Patents, as applicable.

6.3.5 **Recovery.** Except as otherwise agreed by the Parties in connection with a cost sharing arrangement, any recovery realized as a result of such litigation described in Section 6.3.1, 6.3.2 and 6.3.3 (whether by way of settlement or otherwise) shall be [***].

6.3.6 **Other Enforcement.** Except as set forth in this Section 6.3, neither Party shall have any rights to enforce Patents owned or in-licensed by the other Party or its Affiliates.

6.4 Infringement Claims by Third Parties.

6.4.1 If the Manufacture or use of a Licensed Product pursuant to this Agreement results in, or may result in, any claim, suit, or proceeding by a Third Party alleging

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patent infringement by either Party, its Affiliates, Sublicensees or subcontractors, such Party shall promptly notify the other Party thereof in writing. Gilead shall have the first right, but not the obligation, to defend and control the defense of any such claim, suit, or proceeding alleging patent infringement against Gilead, its Affiliate or Sublicensee at [***] cost and expense, using counsel of its own choice. Precision may participate in any such claim, suit, or proceeding with counsel of its choice at [***] cost and expense. Without limitation of the foregoing, if Gilead finds it necessary or desirable for Precision to join Gilead as a party to any such action, the Parties shall cooperate to execute all papers and perform such acts as shall be reasonably required for Precision to join such action. If Gilead elects (in a written communication submitted to Precision within a reasonable amount of time after notice of the alleged patent infringement) not to defend or control the defense of, or otherwise fails to initiate and maintain the defense of, any such claim, suit, or proceeding, within such time periods so that Precision is not prejudiced by any delays, Precision may conduct and control the defense of any such claim, suit, or proceeding at [***] cost and expense. Each Party shall keep the other Party reasonably informed of all material developments in connection with any such claim, suit, or proceeding.

6.4.2 Except as otherwise agreed by the Parties in connection with a cost sharing arrangement, any recovery realized as a result of such litigation described in Section 6.4 (whether by way of settlement or otherwise) shall be [***]. For avoidance of doubt, any recovery realized for infringement of any Precision Patent, Joint Collaboration Program Patents or Gilead Dual Patents shall be subject to Section 6.3.5.

6.4.3 [***].

6.4.4 Nothing in this Section 6.4 shall be construed to limit any rights or obligations of the Parties under ARTICLE 9.

6.5 Invalidity or Unenforceability Defenses or Actions.

6.5.1 **Notice**. Each Party shall promptly notify the other Party in writing of any alleged or threatened assertion of invalidity or unenforceability of any of the Precision Patents, Joint Collaboration Program Patents or Gilead Dual Patents by a Third Party, in each case, of which such Party becomes aware.

6.5.2 **Precision Patents.** Gilead shall have the first right, but not the obligation, at [***] cost and expense, to defend and control the defense of the validity and enforceability of the Precision Patents where such defense is pursuant to Gilead's indemnification obligations under Section 9.1, in response to a claim brought against Gilead or its Affiliates or Sublicensees by a Third Party, or where the other party to the action is engaging in Competitive Infringement. In all other cases of defense of Precision Patents, or if Gilead elects not to defend or control such defense, or otherwise fails to initiate and maintain the defense, Precision shall control such defense. Precision may participate in any such claim, suit, or proceeding defended by Gilead with counsel of its choice at [***] cost and expense; *provided that*, Gilead shall retain control of the defense in such claim, suit, or proceeding. With respect to any such action involving the validity or enforceability of the Precision Patents, if the defending Party finds it necessary or desirable for the other Party to join the defending Party as a party to

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any such action, the other Party shall, at the defending Party's request, join the defending Party as a party to such suit and participate with its own counsel at [***] cost and expense; *provided that*, the defending Party shall retain control of the defense in such claim, suit, or proceeding. If Precision elects not to defend or control the defense of the Precision Patents in a suit brought, or otherwise fails to initiate and maintain the defense of any such claim, suit, or proceeding, then, subject to Precision's rights under Section 6.3.1, Gilead may conduct and control the defense of any such claim, suit, or proceeding at [***] cost and expense. With respect to any such action involving the validity or enforceability of the Precision Patents, if Gilead finds it necessary or desirable for Precision to join Gilead as a party to any such action, Precision shall, at Gilead's request, join Gilead as a party to such suit and participate with its own counsel at [***] cost and expense.

6.5.3 **Joint Collaboration Program Patents.** Gilead shall have the first right, but not the obligation, to defend and control the defense of the validity and enforceability of the Joint Collaboration Program Patents at [***] cost and expense. With respect to any such action involving the validity or enforceability of the Joint Collaboration Program Patents, if Gilead finds it necessary or desirable for Precision to join Gilead as a party to any such action, Precision shall, at Gilead's request, join Gilead as a party to such suit and participate with its own counsel at [***] cost and expense; *provided that*, Gilead shall retain control of the defense in such claim, suit, or proceeding. If Gilead elects not to defend or control the defense of the Joint Collaboration Program Patents in a suit brought, or otherwise fails to initiate and maintain the defense of any such claim, suit, or proceeding, then, subject to Gilead's rights under Section 6.3.1, Precision may conduct and control the defense of any such claim, suit, or proceeding at [***] cost and expense. With respect to any such action involving the validity or enforceability of the Joint Collaboration Program Patents, if Precision finds it necessary or desirable for Gilead to join Precision as a party to any such action, Gilead shall, at Precision's request, join Precision as a party to such suit and participate with its own counsel at [***] cost and expense; *provided that*, Precision shall retain control of the defense in such claim, suit, or proceeding.

6.5.4 **Gilead Dual Patents.** Gilead shall have the right, but not the obligation, to defend and control the defense of the validity and enforceability of the Gilead Dual Patents at [***] cost and expense. With respect to any such action involving the validity or enforceability of the Gilead Dual Patents, if Gilead finds it necessary or desirable for Precision to join Gilead as a party to any such action, Precision shall, at Gilead's request, join Gilead as a party to such suit and participate with its own counsel at [***] cost and expense; *provided that*, Gilead shall retain control of the defense in such claim, suit, or proceeding.

6.5.5 **Cooperation.** Each Party shall assist and cooperate with the other Party as such other Party may reasonably request from time to time in connection with its activities set forth in this Section 6.5, including by being joined as a party plaintiff in such action or proceeding, providing access to relevant documents and other evidence, and making its employees available at reasonable business hours. In connection with any such defense or claim or counterclaim, the controlling Party shall consider in good faith any comments from the other

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Party and shall keep the other Party reasonably informed of any steps taken, and shall provide copies of all documents filed, in connection with such defense, claim, or counterclaim. In connection with the activities set forth in Sections 6.5.2 and 6.5.3, the Prosecuting Party shall consult with the Non-Prosecuting Party as to the strategy for the defense of the Precision Patents and Joint Collaboration Program Patents, as applicable.

6.6 Patent Term Extensions in the Territory. As between the Parties, Gilead shall have the sole right to make decisions regarding, and to apply for, patent term extensions in the Territory, including in the United States with respect to extensions pursuant to 35 U.S.C. §156 et. seq. and in other jurisdictions pursuant to supplementary protection certificates, and in all jurisdictions with respect to any other extensions that are now or become available in the future, wherever applicable, in each case for the Precision HBV Patents and any Joint Collaboration Program Patents, with respect to the Licensed Product(s), including whether or not to do so. Prior to Gilead making any such decisions, the patent counsel of each Party shall discuss and recommend for which, if any, of the Precision HBV Patents and Joint Collaboration Program Patents in the Territory the Parties should seek any term extension, supplementary protection certificates, and equivalents thereof. Precision shall provide prompt and reasonable assistance, as requested by Gilead, including by taking such action as patent holder as is required under any Applicable Law to obtain such extension or supplementary protection certificate. Further, and without limiting the foregoing, Precision shall not apply for any patent term extension based on a Marketing Approval for any Gilead ARC Nuclease or Licensed Product without Gilead's prior written consent and further consultation with Gilead. With respect to Precision Patents that are not Precision HBV Patents, Precision shall discuss with Gilead in good faith options for applying for patent term extensions on such Precision Patents based on a Marketing Approval for any Gilead ARC Nuclease or Licensed Product prior to deciding whether to apply for any such extension.

ARTICLE 7
CONFIDENTIALITY AND NON-DISCLOSURE

7.1 Confidentiality Obligations. At all times during the Term and for a period of [***] following the expiration or termination of this Agreement in its entirety, or, with respect to Confidential Information of either Party comprising trade secrets of such Party that have been labeled by such disclosing Party or identified by such disclosing Party to the other Party as being the disclosing Party's trade secrets, for so long as such Confidential Information is a trade secret of such Party, each Party shall, and shall cause its officers, directors, employees and agents to, keep confidential and not publish or otherwise disclose to a Third Party and not use, directly or indirectly, for any purpose, any Confidential Information furnished or otherwise made known to it, directly or indirectly, by the other Party, except to the extent such disclosure or use is expressly permitted by the terms of this Agreement or is reasonably necessary or useful for the performance of, or the exercise of such Party's rights under, this Agreement. "**Confidential Information**" of a Party means any technical, business, or other information provided by or on behalf of such Party to the other Party in connection with this Agreement,

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whether prior to, on, or after the Effective Date, including (a) the terms and conditions of this Agreement, (b) the ARCUS Technology and the ARCUS Assigned IP, (c) any unpublished Patents, (d) information relating to the Licensed Products (including the Regulatory Documentation generated pursuant to the Collaboration Program), (e) any Development of Gilead ARC Nucleases or the Licensed Products, and any Information with respect thereto developed by or on behalf of the disclosing Party or its Affiliates (including Gilead Dual Know-How and Precision Know-How, as applicable), and (f) information regarding the scientific, regulatory or business affairs or other activities of either Party. All Joint Collaboration Program Know-How and the terms and conditions of this Agreement shall be deemed to be the Confidential Information of both Parties, and both Parties shall be deemed to be the receiving Party and the disclosing Party with respect thereto. Except with respect to the Precision Know-How contained in the chemistry, manufacturing and control (CMC) section of any Regulatory Documentation, all Information contained in the Regulatory Documentation and the Gilead Dual Know-How shall be deemed to be the Confidential Information of Gilead. All ARCUS IP, ARCUS Assigned IP and Precision Know-How shall be deemed to be the Confidential Information of Precision. Notwithstanding the foregoing, the confidentiality and non-use obligations under this Section 7.1 with respect to any Confidential Information shall not include any information that:

7.1.1 is or hereafter becomes part of the public domain by public use, publication, general knowledge or the like through no wrongful act, fault or negligence on the part of the receiving Party;

7.1.2 can be demonstrated by documentation or other competent proof to have been in the receiving Party's possession prior to disclosure by the disclosing Party without any obligation of confidentiality with respect to such information; *provided that*, the foregoing exception shall not apply with respect to the Joint Collaboration Program Know-How;

7.1.3 is subsequently received by the receiving Party from a Third Party who is not bound by any obligation of confidentiality with respect to such information; or

7.1.4 can be demonstrated by documentation or other competent evidence to have been independently developed by or for the receiving Party without use of or reference to the disclosing Party's Confidential Information; *provided that*, the foregoing exception shall not apply with respect to the Joint Collaboration Program Know-How.

Specific aspects or details of Confidential Information shall not be deemed to be within the public domain or in the possession of the receiving Party merely because the Confidential Information is embraced by more general information in the public domain or in the possession of the receiving Party. Further, any combination of Confidential Information shall not be considered in the public domain or in the possession of the receiving Party merely because individual elements of such Confidential Information are in the public domain or in the possession of the receiving Party unless the combination and its principles are in the public domain or in the possession of the receiving Party.

7.2 Permitted Disclosures. Each Party may disclose Confidential Information of the other Party to the extent that such disclosure is:

7.2.1 made by or on behalf of the receiving Party to the Regulatory Authorities as required in connection with any filing, application or request for Regulatory Approval; *provided, however*, that reasonable measures shall be taken to assure confidential treatment of such information to the extent practicable and consistent with Applicable Law;

7.2.2 made by or on behalf of the receiving Party in response to a valid order of a court of competent jurisdiction or other supra-national, federal, national, regional, state, provincial and local governmental or regulatory body of competent jurisdiction or, if in the opinion of the receiving Party's legal counsel and without limiting Section 7.4, such disclosure is otherwise required by Applicable Law (including, for clarity, any disclosure required by Applicable Law on clinicaltrials.gov or disclosure required by reason of filing with securities regulators); *provided, however*, that the receiving Party shall first have given notice to the disclosing Party and given the disclosing Party (a) a reasonable opportunity to quash any such order or to obtain a protective order or confidential treatment requiring that the Confidential Information and documents that are the subject of any such order be held in confidence by such court or agency or, if disclosed, be used only for the purposes for which the order was issued and (b) a right to review and comment upon such disclosure, which comments shall be considered in good faith by the receiving Party; and *provided further* that the Confidential Information disclosed in response to any such court or governmental order shall be limited to that information which is legally required to be disclosed in response to such court or governmental order;

7.2.3 made by or on behalf of the receiving Party to a patent authority as may be reasonably necessary or useful for purposes of obtaining or enforcing a Patent pursuant to the terms of this Agreement in a manner not inconsistent with Article 6; *provided, however*, that reasonable measures shall be taken to assure confidential treatment of such information, to the extent such protection is available; or

7.2.4 made by the receiving Party or its Affiliates, sublicensees or subcontractors to its or their agents, attorneys, auditors, advisors, consultants, contractors, existing or prospective collaboration partners, licensees, sublicensees, investors, insurers or acquirers in connection with the performance of its obligations or exercise of its rights as contemplated by this Agreement; *provided, however*, that such persons shall be subject to obligations of confidentiality and non-use with respect to such Confidential Information substantially similar to the obligations of confidentiality and non-use of the receiving Party pursuant to this ARTICLE 7 (with a duration of confidentiality and non-use obligations as appropriate that is no less than [***] from the date of disclosure); or

7.2.5 made by or on behalf of the receiving Party where such disclosure is required by a Regulatory Authority (including in filings with the Securities and Exchange Commission or other agency) of certain material developments or material information generated under this Agreement; *provided that*, to the extent permitted, the Party seeking such disclosure first provides the other Party a copy of the proposed disclosure; and *provided, further*, that the receiving Party shall afford to the other Party an opportunity to review and comment, which period shall be no less than [***], and the receiving Party shall accept any reasonable comments so provided; or

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7.2.6 made by or on behalf of Precision to Duke solely as and to the extent necessary to fulfill Precision's reporting obligations under the Duke Agreement as of the Effective Date so long as such information is disclosed subject to the confidentiality provisions of the Duke Agreement as of the Effective Date.

7.3 Use of Name. Except as expressly provided herein, neither Party shall mention or otherwise use the name, logo, or trademark of the other Party or any of its Affiliates (or any abbreviation or adaptation thereof) in any publication, press release, marketing and promotional material, or other form of publicity without the prior written approval of such other Party in each instance. The restrictions imposed by this Section 7.3 shall not prohibit either Party from making any disclosure identifying the other Party that is required by Applicable Law.

7.4 Public Announcements. The Parties have agreed upon the content of press release(s) which shall be issued substantially in the form attached hereto as Schedule 7.4, the release of which the Parties shall coordinate in order to accomplish such release at a time following execution of the Agreement to be agreed upon by the Parties. Neither Party shall issue any other public announcement, press release, or other public disclosure regarding this Agreement or its subject matter without the other Party's prior written consent, except for any such disclosure that is, in the opinion of the disclosing Party's counsel, required by Applicable Law, any Regulatory Authority (including filings with the Securities and Exchange Commission or other agency) or the rules of a stock exchange on which the securities of the disclosing Party are listed (or to which an application for listing has been submitted). In the event a Party is, in the opinion of its counsel, required by Applicable Law, any Regulatory Authority (including filings with the Securities and Exchange Commission or other agency) or the rules of a stock exchange on which its securities are listed (or to which an application for listing has been submitted) to make such a public disclosure, and notwithstanding anything to the contrary in Section 7.2, such Party shall submit the proposed disclosure in writing to the other Party as far in advance as reasonably practicable (and in no event less than [***] prior to the anticipated date of disclosure) so as to provide a reasonable opportunity to comment thereon; *provided*, *however*, if a Party is required by Applicable Law, any Regulatory Authority (including filings with the Securities and Exchange Commission or other agency) or the rules of a stock exchange on which the securities of the disclosing Party are listed (or to which an application for listing has been submitted) to disclose this Agreement, such Party shall prepare a proposed redacted version of this Agreement to request confidential treatment for this Agreement, and the other Party may promptly (and in any event, no less than [***] after receipt of such proposed redactions) provide its comments, which comments shall be considered in good faith by the Party required to make such disclosure.

7.5 Publications. Precision shall not publish any papers or make any oral presentations regarding results of, and other information regarding, activities pursuant to the Collaboration Program (such papers and oral presentations, including abstracts of any of the foregoing, "**Publications**") if such papers or presentations disclose any Information relating specifically to HBV, any Gilead ARC Nuclease or the Licensed Product, except as required by Applicable Law, in which case Section 7.2.2 shall apply *mutatis mutandis*. Notwithstanding the

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foregoing, subject to the obligations set forth in Sections 7.1, 7.2, and 7.3, Precision may make Publications relating specifically to the ARCUS Technology or ARCUS Assigned IP, *provided that* for any Publication that discloses Information relating to HBV, any Gilead ARC Nuclease or the Licensed Product, Precision shall (a) provide Gilead with a draft of such Publication at least [***] prior to submission to the publisher, (b) remove any confidential or sensitive Information as requested by Gilead that Gilead reasonably deems to be of a confidential or sensitive nature, (c) delay the submission for publication of such Publication for an additional [***] period to permit the applicable Party under Section 6.2 to seek patent protection with respect to the content of such Information, and (d) consider in good faith any comments from Gilead with respect to the information contained therein pertaining to Licensed Products, Gilead ARC Nucleases or HBV. Gilead may, in its discretion, publish any Publication; *provided that*, Gilead shall (i) provide Precision with a draft of such Publication at least [***] prior to submission to the publisher, (ii) remove any confidential or sensitive Information of Precision related to ARCUS Technology, ARCUS Assigned IP or ARC Nucleases generally, as requested by Precision, (iii) delay the submission for publication of such Publication for an additional [***] period to permit the applicable Party under Section 6.2 the opportunity to seek patent protection with respect to the content of such Information, and (iv) give Precision a pre-publication right to review and comment upon such Publication, which comments shall be considered in good faith by Gilead.

7.6 Return of Confidential Information. Upon the effective date of the termination of this Agreement for any reason, either Party may request in writing, and the other Party shall either, with respect to Confidential Information to which such first Party does not retain rights under the surviving provisions of this Agreement: (a) promptly destroy all copies of such Confidential Information in the possession of the other Party and confirm such destruction in writing to the requesting Party; or (b) promptly deliver to the requesting Party, at the [***] cost and expense, all copies of such Confidential Information in the possession of the other Party; *provided, however*, the other Party shall be permitted to retain one (1) copy of such Confidential Information for the sole purpose of performing any continuing obligations hereunder or for archival purposes. Notwithstanding the foregoing, such other Party also shall be permitted to retain such additional copies of or any computer records or files containing such Confidential Information that have been created solely by such Party's automatic archiving and back-up procedures, to the extent created and retained in a manner consistent with such other Party's standard archiving and back-up procedures, but not for any other use or purpose. All Confidential Information shall continue to be subject to the terms of this Agreement for the period set forth in Section 7.1.

ARTICLE 8
REPRESENTATIONS AND WARRANTIES

8.1 Mutual Representations and Warranties. Each Party represents and warrants to the other Party as of the Effective Date that:

8.1.1 such Party is an entity duly organized, validly existing and in good standing under the Applicable Law of the state or country (as applicable) of its organization, is

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qualified to do business and is in good standing as a foreign entity in each jurisdiction in which the conduct of its business or the ownership of its properties requires such qualification and failure to have such would prevent it from performing its obligations under this Agreement, and has full power and authority to enter into this Agreement and to carry out the provisions hereof;

8.1.2 such Party is duly authorized, by all requisite action, to execute and deliver this Agreement and the execution, delivery and performance of this Agreement by such Party does not require any shareholder action or approval, and the person executing this Agreement on behalf of such Party is duly authorized to do so by all requisite action;

8.1.3 no consent, approval, order or authorization of, or registration, qualification, designation, declaration or filing with, any governmental authority or Regulatory Authority is required on the part of such Party in connection with the valid execution, delivery and performance of this Agreement by it;

8.1.4 such Party has not employed (and, to its knowledge, has not used a contractor or consultant that has employed) and in the future shall not employ (or, to its knowledge , use any contractor or consultant that employs; *provided that*, such Party may reasonably rely on a representation made by such contractor or consultant) any person debarred by the FDA (or subject to a similar sanction of a foreign equivalent), or any person which is the subject of an FDA debarment investigation or proceeding (or similar proceeding of a foreign equivalent), in the conduct of its activities under this Agreement;

8.1.5 this Agreement is a legal and valid obligation binding upon such Party and enforceable in accordance with its terms except as enforceability may be limited by (a) bankruptcy, insolvency, reorganization, moratorium or similar laws affecting the enforcement of creditors' rights; and (b) equitable principles of general applicability; and

8.1.6 the execution, delivery and performance by it of this Agreement and its compliance with the terms and provisions of this Agreement does not and shall not conflict with or result in a breach of any of the terms or conditions of (a) any other contractual or other obligations of such Party, (b) the provisions of its operating documents or bylaws, or (c) any order, writ, injunction or decree of any governmental authority or Regulatory Authority entered against it or by which it or any of its property is bound.

8.2 Additional Representations and Warranties of Precision. Precision further represents and warrants to Gilead as of the Effective Date that:

8.2.1 The Precision Existing Patents comprise all Precision Patents existing as of the Effective Date, other than Cellectis Patents. Precision is the sole and exclusive owner of the entire right, title and interest in, or otherwise Controls, all Precision Existing Patents and all existing ARCUS IP. All Precision Existing Patents owned by Precision, and to the Knowledge of Precision, all Precision Existing Patents in-licensed by Precision, are subsisting and have not been determined by any competent court or other governmental authority to be invalid or unenforceable, in whole or in part. In respect of the Precision Existing Patents owned by Precision, to Precision's Knowledge, Precision and its Affiliates have presented all relevant references, documents, or information to the relevant patent examiner at the relevant patent office as required by any applicable duty of candor. To Precision's Knowledge, each of the Precision Existing Patents properly identifies each and every inventor of the claims thereof as determined in accordance with the laws of the jurisdiction in which such Precision Existing Patent is issued or such application is pending.

8.2.2 There are no pending claims or claims threatened in writing (or to its Knowledge, otherwise threatened), judgments, or settlements against, or amounts with respect thereto, owed by Precision or any of its Affiliates relating to the ARCUS IP or the Precision IP. Except as was resolved in connection with the Cellectis Agreement, no claim or litigation has been brought against Precision or its Affiliates, or, to Precision's Knowledge, threatened in writing by any Person alleging that (a) the ARCUS IP or the Precision IP is invalid or unenforceable or misappropriates any intellectual property or proprietary right of any Person other than the Parties, or (b) the Exploitation of the ARCUS Technology as contemplated herein violates, infringes, or otherwise conflicts or interferes with, or would violate, infringe, or otherwise conflict or interfere with, any intellectual property or proprietary right of any Person other than the Parties.

8.2.3 To Precision's Knowledge, (a) Precision has the right to use all ARCUS IP and Precision IP as necessary to conduct the Development activities in the Collaboration R&D Plan, and (b) the use of the ARCUS IP and the Precision IP in the Development of the Licensed Products as contemplated herein (i) is not subject to any other license or agreement to which Precision or any of its Affiliates is a party other than the Existing In-License Agreements, (ii) does not infringe any Patent or other intellectual property or proprietary right of any Person other than the Parties, or (iii) does not constitute or involve the misappropriation of trade secrets or other rights or property of any Person other than the Parties, but excluding, in each case ((i), (ii) and (iii)), any intellectual property or proprietary right of any Person other than the Parties relating specifically to any HBV Target. For purposes of the representation and warranty in this Section 8.2.3, "Precision's Knowledge" shall also require review of the foregoing representation and warranty with Precision's external patent counsel within [***] prior to execution of this Agreement.

8.2.4 Neither Precision nor any of its Affiliates has previously entered into any agreement, whether written or oral, with respect to, or otherwise assigned, transferred, licensed, conveyed, or otherwise encumbered its right, title, or interest in or to the ARCUS IP, the Precision IP or the Gilead ARC Nucleases (including by granting any covenant not to sue with respect thereto), or any Patent or other intellectual property or proprietary right that would be ARCUS IP or Precision IP but for such assignment, transfer, license, conveyance, or encumbrance, except in each case where such assignment, transfer, license, conveyance, or encumbrance is (a) terminated and no longer in force or effect or (b) not inconsistent with the rights and licenses granted to Gilead under this Agreement.

8.2.5 A true, complete and accurate copy of each of the Existing In-License Agreements has been provided or made available to Gilead in an electronic data room maintained by Precision.

8.2.6 To Precision's Knowledge, each of the Existing In-License Agreements is valid, enforceable and binding on the parties thereto.

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8.2.7 Precision (or its Affiliates) has in all material respects performed its obligations under each of the Existing In-License Agreements, including with respect to any obligations relating to funding received under any of the Existing In-License Agreements, and neither Precision nor any other party thereto has given or received any notice to terminate, or asserted any breach of or default under, any Existing In-License Agreement nor, to Precision's Knowledge, are there any grounds for the termination, avoidance, rescission or repudiation of any Existing In-License Agreement.

8.2.8 To Precision's Knowledge, no Person is infringing or threatening to infringe, or misappropriating or threatening to misappropriate, the Precision IP.

8.2.9 All material adverse information with respect to the safety of the ARCUS Technology within the Knowledge of Precision has been provided or made available to Gilead in an electronic data room maintained by Precision prior to the Effective Date.

8.2.10 All current and former officers, employees, agents and consultants of Precision or any of its Affiliates who are inventors of, or have otherwise contributed in a material manner to the creation or development of, the ARCUS IP or any Precision IP have executed and delivered to Precision or such Affiliate, and to Precision's Knowledge are not in violation of, an assignment or other agreement regarding the protection of proprietary information and the assignment to Precision or such Affiliate of the ARCUS IP or any Precision IP, the current form of which has been made available for review by Gilead.

8.2.11 Neither Precision nor any of its Affiliates has been debarred or is subject to debarment pursuant to Section 306 of the Act, or is the subject of a conviction described in such section.

8.2.12 Except as set forth on Schedule 8.2.12, the inventions claimed or covered by the Precision IP (a) were not conceived, discovered, developed, or otherwise made in connection with any research activities funded, in whole or in part, by the federal government of the United States or any agency thereof, (b) are not a "subject invention" as that term is described in 35 U.S.C. Section 201(f), and (c) are not otherwise subject to the provisions of the Bayh-Dole Act. With regard to any inventions set forth on Schedule 8.2.12 that are subject to the Bayh-Dole Act, Precision and its Affiliates have complied with the applicable provisions of the Bayh-Dole Act, in a manner that protects and preserves Precision's right, title and interest in such inventions to the maximum extent permitted by law.

8.2.13 This Agreement satisfies the requirements to be a "Commercial Product Sublicense" under the Duke Agreement, as amended, as that term is used in such agreement.

8.3 Additional Covenants of Precision.

8.3.1 Neither Precision nor any of its Affiliates shall enter into any agreement, whether written or oral, with respect to, or otherwise assign, transfer, license, convey, or otherwise encumber its right, title, or interest in or to the ARCUS IP, the Precision IP, [***] or the Gilead ARC Nucleases (including by granting any covenant not to sue with respect thereto),

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or any Patent or other intellectual property or proprietary right that would be ARCUS IP or Precision IP but for such assignment, transfer, license, conveyance, or encumbrance, in each case where such assignment, transfer, license, conveyance, or encumbrance is inconsistent with the rights and licenses granted to Gilead under this Agreement.

8.3.2 Neither Precision nor any of its Affiliates shall use in any capacity, in connection with the services to be performed under this Agreement, any Person who has been debarred pursuant to Section 306 of the Act, or who is the subject of a conviction described in such section. Precision agrees to inform Gilead in writing immediately if it or any Person who is performing services hereunder is debarred or is the subject of a conviction described in Section 306 of the Act, or if any action, suit, claim, investigation or legal or administrative proceeding is pending or, to Precision's Knowledge, is threatened, relating to the debarment or conviction of Precision or any Person performing such services.

8.3.3 With regard to any inventions set forth on Schedule 8.2.12 that are subject to the Bayh-Dole Act or other inventions that are subject to the Bayh-Dole Act in the Precision IP, Precision shall, and shall cause its Affiliates to, to comply with the applicable provisions of the Bayh-Dole Act, in a manner that protects and preserves Precision's right, title and interest in such inventions to the maximum extent permitted by law.

8.4 DISCLAIMER OF WARRANTIES. EXCEPT FOR THE EXPRESS REPRESENTATIONS AND WARRANTIES SET FORTH HEREIN, NEITHER PARTY MAKES ANY REPRESENTATIONS OR GRANTS ANY WARRANTIES, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, BY STATUTE OR OTHERWISE, AND EACH PARTY SPECIFICALLY DISCLAIMS ANY OTHER WARRANTIES, WHETHER WRITTEN OR ORAL, OR EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF QUALITY, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR USE OR PURPOSE OR ANY WARRANTY AS TO THE VALIDITY OF ANY PATENTS OR THE NON-INFRINGEMENT OF ANY IP RIGHTS OF THIRD PARTIES OR THE AVAILABILITY OF ANY LICENSES WITH RESPECT TO IP RIGHTS OF THIRD PARTIES.

ARTICLE 9
INDEMNITY

9.1 Indemnification of Precision. Gilead shall indemnify Precision, its Affiliates, Duke, and its and their respective directors, officers, employees, and agents, and defend and save each of them harmless, from and against any and all losses, damages, liabilities, costs, and expenses (including reasonable attorneys' fees and expenses) (collectively, "**Losses**") in connection with any and all suits, investigations, claims, or demands of Third Parties (collectively, "**Third Party Claims**") arising from or occurring as a result of: (a) the breach by Gilead of any representation, warranty or covenant in this Agreement, (b) the gross negligence or willful misconduct on the part of Gilead or its Affiliates or its or their respective directors, officers, employees, and agents in performing its or their obligations under this Agreement,

(c) [***], or (d) [***], except, in each case of clause (a) - (d), for those Losses for which Precision has an obligation to indemnify Gilead pursuant to Section 9.2 hereof, as to which Losses each Party shall indemnify the other to the extent of their respective liability.

9.2 Indemnification of Gilead. Precision shall indemnify Gilead, its Affiliates and its and their respective directors, officers, employees, and agents, and defend and save each of them harmless, from and against any and all Losses in connection with any and all Third Party Claims arising from or occurring as a result of: (a) the breach by Precision of any representation, warranty or covenant of this Agreement, (b) the gross negligence or willful misconduct on the part of Precision or its Affiliates or its or their respective directors, officers, employees, and agents in performing its obligations under this Agreement, (c) [***], or (d) [***], except, in each case of clause (a) - (d), for those Losses for which Gilead has an obligation to indemnify Precision pursuant to Section 9.1 hereof, as to which Losses each Party shall indemnify the other to the extent of their respective liability.

9.3 Notice of Claim. All indemnification claims in respect of a Party, its Affiliates, or their respective directors, officers, employees and agents shall be made solely by such Party to this Agreement (the "**Indemnified Party**"). The Indemnified Party shall give the indemnifying Party (the "**Indemnifying Party**") written notice (an "**Indemnification Claim Notice**") of any Losses or discovery of fact upon which such Indemnified Party intends to base a request for indemnification under this ARTICLE 9 within [***] after receipt by such Indemnified Party of actual notice of the Third Party Claim; *provided that*, failure to give such notification shall not affect the indemnification provided under Section 9.1 or Section 9.2, as applicable, except to the extent the Indemnifying Party has been actually prejudiced as a result of such failure. Each Indemnification Claim Notice must contain a description of the claim and the nature and amount of such Loss (to the extent that the nature and amount of such Loss is known at such time). The Indemnified Party shall furnish promptly to the Indemnifying Party copies of all papers and official documents received in respect of any Losses and Third Party Claims.

9.4 Control of Defense.

9.4.1 **In General.** At its option, the Indemnifying Party may assume the defense of any Third Party Claim by giving written notice to the Indemnified Party within [***] after the Indemnifying Party's receipt of an Indemnification Claim Notice only if the Indemnifying Party has acknowledged to the Indemnified Party in writing that the Indemnifying Party is liable to indemnify the Indemnified Party in respect of such Third Party Claim. Upon assuming the defense of a Third Party Claim, the Indemnifying Party may appoint as lead counsel in the defense of the Third Party Claim any legal counsel selected by the Indemnifying Party. In the event the Indemnifying Party assumes the defense of a Third Party Claim, the Indemnified Party shall immediately deliver to the Indemnifying Party all original notices and documents (including court papers) received by the Indemnified Party in connection with the Third Party Claim. Should the Indemnifying Party assume the defense of a Third Party Claim, except as provided in Section 9.4.2, the Indemnifying Party shall not be liable to the Indemnified Party for any legal expenses subsequently incurred by such Indemnified Party in connection with the analysis, defense or settlement of the Third Party Claim unless specifically requested in

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writing by the Indemnifying Party. In the event that it is ultimately determined that the Indemnifying Party is not obligated to indemnify, defend or hold harmless the Indemnified Party from and against the Third Party Claim, the Indemnified Party shall reimburse the Indemnifying Party for any and all costs and expenses (including attorneys' fees and costs of suit) and any Losses incurred by the Indemnifying Party in its defense of the Third Party Claim.

9.4.2 **Right to Participate in Defense.** Without limiting Section 9.4.1, any Indemnified Party shall be entitled to participate in, but not control, the defense of such Third Party Claim and to employ counsel of its choice for such purpose; *provided*, *however*, that such employment shall be at the [***] cost and expense unless (a) the employment thereof has been specifically authorized by the Indemnifying Party in writing, (b) the Indemnifying Party has failed to assume the defense and employ counsel in accordance with Section 9.4.1 (in which case the Indemnified Party shall control the defense), or (c) the interests of the indemnitee and the Indemnifying Party with respect to such Third Party Claim are sufficiently adverse to prohibit the representation by the same counsel of both Parties under Applicable Law, ethical rules or equitable principles.

9.4.3 **Settlement.** With respect to any Losses relating to a Third Party Claim, the Indemnifying Party shall have the sole right to consent to the entry of any judgment, enter into any settlement or otherwise dispose of such Loss, at [***] cost and expense, on such terms as the Indemnifying Party, in its sole discretion, shall deem appropriate; *provided that*, such settlement shall not result in the Indemnified Party's becoming subject to injunctive or other relief or otherwise adversely affecting the business of the Indemnified Party in any manner. For any other settlement, the Indemnifying Party shall have the right to consent to the entry of any judgment, enter into any settlement or otherwise dispose of such Loss only if it obtains the prior written consent of the Indemnified Party (which consent shall not be unreasonably withheld, conditioned or delayed). If the Indemnifying Party does not assume and conduct the defense of a Third Party Claim as provided above, the Indemnified Party may defend against such Third Party Claim and enter into any settlements of otherwise dispose of such Loss at the [***] cost and expense.

9.4.4 **Cooperation.** Regardless of whether the Indemnifying Party chooses to defend any Third Party Claim, the Indemnified Party shall, and shall cause each indemnitee to, cooperate in the defense thereof and shall furnish such records, information and testimony, provide such witnesses and attend such conferences, discovery proceedings, hearings, trials and appeals as may be reasonably requested in connection therewith. Such cooperation shall include access during normal business hours afforded to the Indemnifying Party to, and reasonable retention by the Indemnified Party of, records and information that are reasonably relevant to such Third Party Claim, and making the Indemnified Party and other employees and agents available on a mutually convenient basis to provide additional information and explanation of any material provided hereunder, and the Indemnifying Party shall reimburse the Indemnified Party for all its reasonable out-of-pocket expenses in connection therewith.

9.4.5 **Expenses.** Except as provided above, the costs and expenses, including fees and disbursements of counsel, incurred by the Indemnified Party in connection

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with any claim shall be reimbursed on a Calendar Quarter basis by the Indemnifying Party, without prejudice to the Indemnifying Party's right to contest the Indemnified Party's right to indemnification and subject to refund in the event the Indemnifying Party is ultimately held not to be obligated to indemnify the Indemnified Party.

9.5 Special, Indirect, and Other Losses. EXCEPT IN THE EVENT OF A PARTY'S BREACH OF ITS OBLIGATIONS UNDER ARTICLE 7, AND EXCEPT TO THE EXTENT ANY SUCH DAMAGES ARE REQUIRED TO BE PAID TO A THIRD PARTY AS PART OF A CLAIM FOR WHICH A PARTY PROVIDES INDEMNIFICATION UNDER THIS ARTICLE 9, NEITHER PARTY NOR ANY OF ITS AFFILIATES SHALL BE LIABLE IN CONTRACT, TORT, NEGLIGENCE, BREACH OF STATUTORY DUTY OR OTHERWISE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES (INCLUDING DAMAGES RESULTING FROM LOSS OF USE, LOSS OF PROFITS, INTERRUPTION OR LOSS OF BUSINESS, DIMINUTION IN VALUE, OR OTHER ECONOMIC LOSSES) ARISING OUT OF ANY ACTIVITIES WITHIN THE SCOPE OF THIS AGREEMENT OR WITH RESPECT TO A PARTY'S PERFORMANCE OR NON PERFORMANCE HEREUNDER.

9.6 Insurance.

9.6.1 **Insurance Maintained by Precision.** During the Term, Precision shall have and maintain in full force and effect, at its own expense, insurance coverage to include:

(a) Commercial general liability insurance, including personal and advertising injury, and Licensed Products and completed operations, with limits of liability not less than [***] per occurrence and [***] in the aggregate. General liability limit requirements may be satisfied by a combination of primary and umbrella or excess liability insurance coverage;

(b) Workers' compensation insurance in compliance with Applicable Law (including the local law requirements of the state or jurisdiction in which the work is to be performed). Employer's liability insurance in amounts not less than [***] for each of (i) bodily injury by accident (each accident), (ii) bodily injury by disease (policy limit), and (iii) bodily injury by disease (each employee). Where permitted by Applicable Law, such policies shall contain a waiver of the insurer's subrogation rights against Gilead; and

(c) Automobile liability insurance for bodily injury, property damage and automobile contractual liability covering all owned, hired and non-owned automobiles with a combined single limit of liability for each accident of not less than [***].

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9.6.2 **Insurance Maintained by Gilead.** During the Term, Gilead shall have and maintain in full force and effect, at its own expense, insurance coverage to include:

(a) Commercially purchased insurance in accordance with the following:

(i) Commercial general liability insurance, including personal and advertising injury, and Licensed Products and completed operations with limits of liability not less than [***] per occurrence and [***] in the aggregate. General liability limit requirements may be satisfied by a combination of primary and umbrella or excess liability insurance coverage;

(ii) Workers' compensation insurance in compliance with Applicable Law (including the local law requirements of the state or jurisdiction in which the work is to be performed). Employer's liability insurance in amounts not less than [***] for each of (A) bodily injury by accident (each accident), (B) bodily injury by disease (policy limit), and (C) bodily injury by disease (each employee). Where permitted by Applicable Law, such policies shall contain a waiver of the insurer's subrogation rights against Precision;

(iii) Automobile Liability insurance for bodily injury, property damage and automobile contractual liability covering all owned, hired and non-owned automobiles with a combined single limit of liability for each accident of not less than [***]; and

(iv) Clinical trials liability insurance with limits not less than [***] per occurrence; or

(b) Self-insurance substantially equivalent to the coverage described in Section 9.6.2(a) above.

9.6.3 **Additional Requirements.**

(a) **Additional Insured.** Each Party shall name the other Party as an additional insured on the insurance policies maintained pursuant to Section 9.6.1(a), Section 9.6.1(c), Section 9.6.2(a)(i), Section 9.6.2(a)(iii) and Section 9.6.2(a)(iv), as applicable, either by endorsement or blanket additional insured endorsement.

(b) **Evidence of Insurance.** Each Party will provide evidence of insurance maintained pursuant to this Section 9.6 on request of the other Party.

(c) **Notice of Cancellation.** Each Party will provide the other Party a notice of insurance policy cancellation in accordance with the provisions of the applicable insurance policy maintained pursuant to this Section 9.6.

(d) **Policy Type.** Insurance policies maintained pursuant to this Section 9.6 should be occurrence type. If policies maintained pursuant to this Section 9.6 are claims made, then insurance shall be maintained for at least [***] following expiration or termination of this Agreement.

(e) **Insurance Carrier Rating.** All insurance maintained pursuant to this Section 9.6 will be underwritten by companies with an AM best rating of at least A-VII.

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ARTICLE 10
TERM AND TERMINATION

10.1 Term. This Agreement shall commence on the Effective Date and, unless earlier terminated in accordance herewith, shall continue in force and effect, on a Licensed Product-by-Licensed Product and country-by-country basis until the expiration of the Royalty Term for such Licensed Product in such country (the "**Term**"). Upon expiration of the Royalty Term (but not on early termination of this Agreement), on a Licensed Product-by-Licensed Product and country-by-country basis the license granted to Gilead pursuant to Section 4.1.1 shall be a fully paid-up, irrevocable, perpetual license that will be exclusive unless and until such time as a Biosimilar Product launches or has launched with respect to the applicable Licensed Product in the applicable country (and from such time will be non-exclusive), and the non-exclusive license granted to Gilead pursuant to Section 4.1.2 shall be fully paid-up, irrevocable and perpetual.

10.2 Termination by Either Party.

10.2.1 **Termination for Material Breach.** Without prejudice and in addition to any other contractual remedy the non-breaching Party may have with respect to this Agreement, either Party may, upon a material breach of this Agreement by the other Party, terminate this Agreement by providing [***] prior written notice (or [***]' prior written notice in the event such material breach is solely based on the breaching Party's failure to pay any amounts due hereunder) to the breaching Party, specifying in such notice the breaching Party's material breach and demanding its cure, with such termination being effective upon the end of such [***] (or [***], as applicable) cure period or, if applicable, the end of the extended cure period set forth in the immediately following sentence, in each case if the applicable material breach has not then been cured. Notwithstanding the foregoing, with respect to a material breach that is not solely based on the breaching Party's failure to pay any amounts due hereunder, if such material breach is not reasonably curable within the [***] cure period, the non-breaching Party's right to terminate this Agreement pursuant to this Section 10.2.1 shall be suspended only if, and only for so long as, (x) the breaching Party has provided to the non-breaching Party a written plan that is reasonably calculated to effect a cure and that includes a proposed extended cure period (not to exceed [***] after the original [***] cure period), (y) the non-breaching Party confirms in writing that such plan is reasonably acceptable to the non-breaching Party and (z) the breaching Party commits to and does carry out such plan no later than the end of the extended cure period set forth in the written plan described in clause (x) of this sentence.

10.2.2 **Termination for Insolvency.** In the event that either Party (a) makes an assignment for the benefit of creditors, (b) appoints or suffers appointment of a receiver or trustee over substantially all of its property that is not discharged within [***] after such filing, (c) proposes a written agreement of composition with its creditors, (d) proposes or is a party to any dissolution or liquidation, (e) files a petition under any bankruptcy or insolvency act or has any such petition filed against that is not discharged within [***] of the filing thereof (excluding a reorganization proceeding under Chapter 11 of the U.S. Bankruptcy Code if the

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debtor Party is continuing to perform all of its obligations under this Agreement), or (f) admits in writing its inability generally to meet its obligations as they fall due in the general course, then the other Party may terminate this Agreement in its entirety effective immediately upon written notice to such Party.

10.3 Additional Termination Rights by Gilead.

10.3.1 **For Convenience.** Gilead may terminate this Agreement, for any reason or no reason, upon:

(a) [***] prior written notice to Precision, if such notice is provided during the Collaboration Term; and

(b) [***] prior written notice to Precision, if such notice is provided on or after the expiry of the Collaboration Term.

10.3.2 **For Certain Events of Change of Control of Precision or Assignment of Agreement during the Collaboration Term.** Precision agrees to notify Gilead promptly in writing in the event Precision has entered into a transaction that effects a Change of Control of Precision or assignment or transfer of this Agreement by Precision, or would effect a Change of Control of Precision or assignment or transfer of this Agreement by Precision upon the closing of the transaction, or an event occurs that triggers a Change of Control of Precision or assignment or transfer of this Agreement by Precision. During the Collaboration Term, Gilead may terminate this Agreement in the event of a Change of Control that results in Precision being controlled by, or assignment or transfer of this Agreement by Precision to, a Third Party that is clinically developing or commercializing products in the field of HBV, upon [***] prior written notice to Precision, so long as such notice is sent no later than [***] after Gilead becomes aware of such Change of Control.

10.4 Additional Termination Rights by Precision [***].

10.5 Rights in Bankruptcy. All rights and licenses granted under or pursuant to this Agreement by Gilead or Precision are, and shall otherwise be deemed to be, for purposes of Section 365(n) of the U.S. Bankruptcy Code or any analogous provisions in any other country or jurisdiction, licenses of rights to "intellectual property" as defined under Section 101 of the U.S. Bankruptcy Code. The Parties agree that the Parties, as licensees of such rights under this Agreement, shall retain and may fully exercise all of their rights and elections under the U.S. Bankruptcy Code or any analogous provisions in any other country or jurisdiction. The Parties further agree that, in the event of the commencement of a bankruptcy proceeding by or against either Party under the U.S. Bankruptcy Code or any analogous provisions in any other country or jurisdiction, the Party that is not a party to such proceeding shall be entitled to a complete duplicate of (or complete access to, as appropriate) any such intellectual property and all embodiments of such intellectual property to which such Party is entitled to have access under this Agreement, which, if not already in the non-debtor Party's possession, shall be promptly delivered to it (a) upon any such commencement of a bankruptcy proceeding upon the non-debtor Party's written request therefor, unless the Party subject to such proceeding elects to

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continue to perform all of its obligations under this Agreement, or (b) if not delivered under clause (a) above, following the rejection of this Agreement by or on behalf of the Party subject to such proceeding upon written request therefor by the non-debtor Party. The Parties acknowledge and agree that payments made under Section 5.1 shall not (x) constitute royalties within the meaning of Section 365(n) of the U.S. Bankruptcy Code or any analogous provisions in any other country or jurisdiction or (y) relate to licenses of intellectual property hereunder.

10.6 Effects of Termination.

10.6.1 **Termination by Gilead for Convenience or by Precision for Material Breach or Insolvency.** In the event of a termination of this Agreement by Gilead under Section 10.3.1 or by Precision under Section 10.2.1, Section 10.2.2 or Section 10.4:

(a) The rights and licenses granted to Gilead under Section 4.1, including any sublicenses, shall be terminated and all such rights shall revert to Precision, except to the extent and for so long as necessary for Gilead to fulfil its responsibilities under the surviving terms of this Agreement as provided in Section 10.8, it being agreed that all such activities shall be discontinued and cease (unless otherwise agreed or required under Applicable Law, by transitioning such activities and responsibilities to Precision) as promptly as possible, subject to Applicable Law.

(b) If a payment pursuant to the Gilead Funding Commitment is due after notice of termination is given and before the effective date of termination, the payment due by Gilead shall be pro-rated based on the portion of the applicable six (6) month period of the Collaboration Term to have elapsed upon the effective date of termination.

(c) If at the effective date of termination, Gilead is Manufacturing Licensed Product(s), then, if Precision requests in writing to Gilead within [***] of the effective date of termination, Gilead agrees to Manufacture and supply such Licensed Product(s) to Precision for a reasonable transitional period (not to exceed [***]) from the effective date of termination pursuant to a reasonable and customary transitional supply and quality agreement to be agreed by the Parties in a form reasonably acceptable to Gilead and Precision. Such Licensed Products shall be supplied at [***] of COGS as further defined in the Supply Agreement, plus any amounts due to a Third Party as a result of the sale of such Licensed Product by Gilead or Precision.

(d) [***].

(e) At Precision's request, Gilead agrees to enter into an agreement with Precision, to be negotiated promptly and in good faith, that includes all terms reasonably necessary to transition the Development, use, Manufacture, promotion, marketing and Exploitation of the Licensed Products to Precision, including the following:

(i) a worldwide, royalty-bearing, non-transferable (except as permitted by such agreement), exclusive or non-exclusive (as requested by Precision), license (or sublicense, as the case may be), with the right to grant sublicenses in accordance with such agreement, to Precision under the Reversion IP (to the extent not licensed pursuant to Section 10.6.1(d)) to Exploit the Licensed Products in the Field in the Territory;

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(ii) transition to Precision of all reasonably necessary materials, licenses, Third Party agreements, preclinical and clinical data, safety data, Clinical Studies, Regulatory Documentation, Regulatory Approvals and applications and product trademarks; and

(iii) provision of technical assistance (including reasonable caps on hours of access) from Gilead relating to the Manufacture, testing and supply of the Licensed Products.

(f) The Parties shall negotiate in good faith the commercially reasonable compensation to Gilead for the obligations of Gilead under the agreement entered into Section 10.6.1(e), based on Gilead's contributions to the Licensed Products up to the time of termination. In the event the Parties cannot agree on such compensation terms, or any other terms of such agreement, then either Party may refer the disputed terms to one or more arbitrator(s) under the principles of baseball arbitration (i.e., each Party submits a proposed resolution to the arbitrator, and the arbitrator is required to select one of the proposed resolutions), the procedures of which shall be reasonably acceptable to both Parties and shall include express consideration by the arbitrator of the fair market value of the license provided by Gilead in Section 10.6.1(e)(i), the materials transferred under Section 10.6.1(e) and other Relevant Factors.

10.6.2 **Termination by Gilead for Material Breach, Insolvency or Change of Control.** If Gilead is entitled to terminate this Agreement pursuant to Section 10.2.1, Section 10.2.2 or 10.3.2, Gilead may elect to terminate this Agreement subject to the provisions set forth in Section 10.6.1(a) and (b) and, in the case of termination pursuant to Section 10.3.2, Section 10.6.1(d).

10.7 Remedies. Except as otherwise expressly provided herein, termination of this Agreement in accordance with the provisions hereof shall not limit remedies that may otherwise be available in law or equity.

10.8 Accrued Rights; Surviving Obligations. Expiration or termination of this Agreement shall not affect the rights and obligations of each Party under this Agreement that have accrued prior to such date of expiration or termination, and the following provisions shall survive expiration or termination of this Agreement: ARTICLE 1, Sections 4.1.1 and 4.1.2 (solely to the extent provided in Section 10.1 on expiration of this Agreement), Sections 4.2.2 (to the extent that the applicable Information constituted Gilead Dual Know-How or the applicable Patents constituted Gilead Dual Patents, in each case as of the date of termination of this Agreement, including, for clarity, Patents filed or issued at any later date covering or claiming applicable inventions conceived on or prior to such date), 4.3.2, and 4.3.3 (solely to the extent applicable to the license set forth in Section 4.2.2), Sections 4.4, 5.8, 5.9 and 5.10, 6.1 (excluding the proviso in Section 6.1.3(b)), 6.2.2, 6.2.3, 6.2.4, 6.3.2, 6.5.3, ARTICLE 7, ARTICLE 8, ARTICLE 9, Sections 10.6, 10.7 and 10.8 and ARTICLE 11.

ARTICLE 11
MISCELLANEOUS

11.1 Force Majeure. Neither Party shall be held liable or responsible to the other Party or be deemed to have defaulted under or breached this Agreement for failure or delay in fulfilling or performing any term of this Agreement (other than an obligation to make payments) when such failure or delay is caused by or results from events beyond the reasonable control of the non-performing Party, including fires, floods, earthquakes, hurricanes, embargoes, shortages, epidemics, quarantines, war, acts of war (whether war be declared or not), terrorist acts, insurrections, riots, civil commotion, strikes, lockouts, or other labor disturbances (whether involving the workforce of the non-performing Party or of any other Person), acts of God or acts, omissions or delays in acting by any governmental authority or Regulatory Authority (except to the extent such delay results from the breach by the non-performing Party or any of its Affiliates of any term or condition of this Agreement). The non-performing Party shall notify the other Party of such force majeure within [***] after such occurrence by giving written notice to the other Party stating the nature of the event, its anticipated duration, and any action being taken to avoid or minimize its effect. The suspension of performance shall be of no greater scope and no longer duration than is necessary and the non-performing Party shall use Commercially Reasonable Efforts to remedy its inability to perform as promptly as possible.

11.2 Export Control. This Agreement is made subject to any restrictions concerning the export of Licensed Products or technical information from the United States or other countries that may be imposed on the Parties from time to time. Each Party agrees that it shall not export, directly or indirectly, any technical information acquired from the other Party under this Agreement or any Licensed Products using such technical information to a location or in a manner that at the time of export requires an export license or other governmental approval, without first obtaining the written consent to do so from the appropriate agency or other governmental authority or Regulatory Authority in accordance with Applicable Law.

11.3 Assignment. This Agreement and the rights and obligations hereunder shall not be assignable, transferable or delegable by either Party without the prior written consent of the other Party; *provided that*, either Party may assign or transfer any or all of its rights and assign, transfer or delegate any or all of its obligations under this Agreement to (a) any of its Affiliates or (b) a successor to all or substantially all of its business related to this Agreement (including in connection with a merger, consolidation, or sale of all or substantially all of its assets related to this Agreement), in each case (a) and (b), without the prior written consent of the other Party. Notwithstanding the foregoing, Precision shall not be required to obtain Gilead's consent to sell, assign, pledge as security, contribute, or otherwise transfer, in whole or in part, to any Third Party its rights to receive any payment under this Agreement, and, as it relates to any such transfer, Precision may provide to such Third Party (i) a copy of reports received from Gilead pursuant to Section 5.4.10 and (ii) the result of any audit conducted pursuant to Section 5.9, in each case of (i) and (ii), so long as any such Third Party is bound by confidentiality and non-use obligations equivalent in scope to those set forth in ARTICLE 7 of this Agreement. Any attempted assignment, transfer or delegation in violation of this Section 11.3 shall be null and

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void, except to the extent otherwise permitted under Section 4.3. Notwithstanding anything to the contrary in this Agreement, the Patents and Information Controlled by an Acquirer (or any Affiliate of any such Acquirer existing prior to the closing of the transaction) of a Party under this Agreement shall be automatically excluded from the rights licensed to the other Party under this Agreement to the extent (A) such Patents and Information were filed or developed, respectively, prior to the transaction that was the basis for such assignment, transfer or succession or resulted in such Person becoming an Affiliate, or (B) such Patents and Information were developed after such transaction under a separate and firewalled program not under this Agreement without use of any Patents, Know-How or Confidential Information of the other Party that is licensed hereunder.

11.4 Severability. If any provision of this Agreement is held to be illegal, invalid, or unenforceable under any present or future law, and if the rights or obligations of either Party under this Agreement shall not be materially and adversely affected thereby, (a) such provision shall be fully severable, (b) this Agreement shall be construed and enforced as if such illegal, invalid, or unenforceable provision had never comprised a part hereof, (c) the remaining provisions of this Agreement shall remain in full force and effect and shall not be affected by the illegal, invalid, or unenforceable provision or by its severance herefrom, and (d) in lieu of such illegal, invalid, or unenforceable provision, there shall be added automatically as a part of this Agreement a legal, valid, and enforceable provision as similar in terms to such illegal, invalid, or unenforceable provision as may be possible and reasonably acceptable to the Parties. To the fullest extent permitted by Applicable Law, each Party hereby waives any provision of law that would render any provision hereof illegal, invalid, or unenforceable in any respect.

11.5 Governing Law.

11.5.1 **Governing Law.** This Agreement shall be governed by, and construed in accordance with, the laws of the state of New York, regardless of the laws that might otherwise govern under applicable principles of conflicts of laws thereof.

11.5.2 **Jurisdiction; Venue; Service of Process.** Each Party irrevocably submits to the exclusive jurisdiction of the state or federal courts located in the State and County of New York for the purposes of any Action arising out of this Agreement. Each Party agrees to commence any such Action either in the state courts of New York or the United States District Court for the Southern District of New York. Each Party further agrees that service of any process, summons, notice or document by the U.S. registered mail to such Party's respective address set forth in Section 11.7 shall be effective service of process for any Action in New York with respect to any matters to which it has submitted to jurisdiction in this Section 11.5.2. Each Party irrevocably and unconditionally waives any objection to the laying of venue of any Action arising out of this Agreement in the state or federal courts of New York, and hereby and thereby further irrevocably and unconditionally waives and agrees not to plead or claim in any such court that any such Action brought in any such court has been brought in an inconvenient forum.

11.5.3 **Waiver of Right to Trial by Jury.** EACH PARTY HERETO WAIVES ITS RIGHT TO TRIAL OF ANY ISSUE BY JURY. Each Party hereto (a) certifies that no Representative or attorney of the other Party has represented, expressly or otherwise, that such Party would not, in the event of any Action, seek to enforce the foregoing waiver and (b) acknowledges that it and the other Party have been induced to enter into this Agreement, by, among other things, the mutual waiver and certifications in this Section 11.5.3.

11.5.4 **Equitable Relief.** Each Party acknowledges and agrees that the restrictions set forth in Section 4.5 and ARTICLE 6 and ARTICLE 7 are reasonable and necessary to protect the legitimate interests of the other Party and that such other Party would not have entered into this Agreement in the absence of such restrictions, and that any breach or threatened breach of any provision of such Section or Articles may result in irreparable injury to such other Party for which there will be no adequate remedy at law. In the event of a breach or threatened breach of any provision of such Section or Articles, the non-breaching Party shall be authorized and entitled to seek injunctive relief, whether preliminary or permanent, specific performance, and an equitable accounting of all earnings, profits, and other benefits arising from such breach, which rights shall be cumulative and in addition to any other rights or remedies to which such non-breaching Party may be entitled in law or equity to prevent such breach or threatened breach of this Agreement and to enforce specifically the terms and provisions of such Section or Articles of this Agreement in the state and federal courts of New York. Both Parties agree to waive any requirement that the other (a) post a bond or other security as a condition for obtaining any such relief, and (b) show irreparable harm, balancing of harms, consideration of the public interest, or inadequacy of monetary damages as a remedy. Nothing in this Section 11.5.4 is intended, or should be construed, to limit either Party's right to equitable relief or any other remedy for a breach of any other provision of this Agreement.

11.6 Dispute Resolution. The Parties recognize that disputes as to certain matters may from time to time arise that relate to either Party's rights or obligations hereunder, including the interpretation, alleged breach, enforcement, termination or validity of this Agreement (a "**Dispute**"). For clarity, Dispute shall not include matters within the JSC's authority, which are resolved under Section 2.3.3 including through the exercise by Gilead or Precision of its final decision making authority in accordance therewith. Any Dispute shall be referred to the Senior Officers of the Parties, who shall confer in good faith on the resolution of the issue. Any final decision mutually agreed to by the Senior Officers shall be conclusive and binding on the Parties. If the Senior Officers are not able to agree on the resolution of any such issue within [***] after such issue was first referred to them, then, either Party may initiate litigation in accordance with Section 11.5 or with respect to Disputes that involve the infringement or validity of any Precision Patents, Joint Collaboration Program Patents or Gilead Dual Patents outside the United States, such Dispute shall be resolved by a court of competent jurisdiction, notwithstanding Section 11.5, in any country in which such rights apply. Notwithstanding anything herein to the contrary, nothing in this Section 11.6 shall preclude either Party from seeking interim or provisional relief, including a temporary restraining order, preliminary injunction or other interim equitable relief concerning a Dispute, if necessary to protect the interests of such Party.

11.7 Notices.

11.7.1 **Notice Requirements.** Any notice, request, demand, waiver, consent, approval, or other communication permitted or required under this Agreement shall be in writing, shall refer specifically to this Agreement and shall be deemed given only if delivered by hand or sent by facsimile transmission (with transmission confirmed) or by internationally

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recognized overnight delivery service that maintains records of delivery, addressed to the Parties at their respective addresses specified in Section 11.7.2 or to such other address as the Party to whom notice is to be given may have provided to the other Party in accordance with this Section 11.7.1. Such notice shall be deemed to have been given as of the date delivered by hand or transmitted by facsimile (with transmission confirmed) or on the second Business Day (at the place of delivery) after deposit with an internationally recognized overnight delivery service. Any notice delivered by facsimile shall be confirmed by a hard copy delivered as soon as practicable thereafter. This Section 11.7.1 is not intended to govern the day-to-day business communications necessary between the Parties in performing their obligations under the terms of this Agreement.

11.7.2 **Address for Notice.**

If to Gilead, to:

Gilead Sciences, Inc.
333 Lakeside Drive
Foster City, CA 94404
Attn: Alliance Management
Email: [***]

with a copy (which shall not constitute notice) to:

Gilead Sciences, Inc.
333 Lakeside Drive
Foster City, CA 94404
Attn: General Counsel
Email: [***]

If to Precision, to:

Precision BioSciences, Inc.
302 East Pettigrew Street, Suite A-100
Durham, NC 27701
Attention: Michael Dombeck, Vice President, Business Development
Facsimile: (480) 393-5553

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with a copy (which shall not constitute notice) to:

Smith, Anderson, Blount, Dorsett, Mitchell & Jernigan, LLP
150 Fayetteville Street, Suite 2300
Raleigh, NC 27601
Attention: John R. Therien, Esq.
Facsimile: (919) 821-6800

11.8 Entire Agreement. This Agreement, together with the Schedules expressly contemplated hereby and attached hereto, and together with the Supply Agreement and the Quality Agreement (once executed), contains the entire agreement among the parties with respect to the subject matter hereof and supersede all prior agreements or understandings between the Parties with respect to the subject matter hereof, including the Confidentiality Agreement and the Material Transfer Agreement between the Parties dated as of February 22, 2016 (as amended). Each Party confirms that it is not relying on any representations or warranties of the other Party except as specifically set forth in this Agreement.

11.9 English Language. This Agreement shall be written and executed in, and all other communications under or in connection with this Agreement shall be in, the English language. Any translation into any other language shall not be an official version thereof, and in the event of any conflict in interpretation between the English version and such translation, the English version shall control.

11.10 Amendments and Waivers.

11.10.1 No modification, amendment or waiver of any provision of, or consent or approval required by, this Agreement, nor any consent to or approval of any departure herefrom, shall be effective unless it is in writing and signed by the Party against whom enforcement of any such modification, amendment, waiver, consent or approval is sought. Such modification, amendment, waiver, consent or approval shall be effective only in the specific instance and for the purpose for which given.

11.10.2 Neither the failure of either Party to enforce, nor the delay of either Party in enforcing, any condition or part of this Agreement at any time shall be construed as a waiver of that condition or part or forfeit any rights to future enforcement thereof. No action taken pursuant to this Agreement, including any investigation by or on behalf of either Party, shall be deemed to constitute a waiver by the Party taking action of compliance by the other Party with any representation, warranty, covenant, agreement or obligation contained herein.

11.11 Cumulative Rights. Except as expressly provided herein, the various rights under this Agreement shall be construed as cumulative, and no one of them is exclusive of any other or exclusive of any rights allowed by Applicable Law.

11.12 Benefits of Agreement. All of the terms and provisions of this Agreement shall be binding upon and inure to the benefit of the Parties and their respective successors and permitted assigns. Except for the provisions of ARTICLE 9, this Agreement is for the sole benefit of the Parties and not for the benefit of any other Person other than Duke to the extent required by the Duke Agreement.

11.13 Further Assurance. Each Party shall duly execute and deliver, or cause to be duly executed and delivered, such further instruments and do and cause to be done such further acts and things, including the filing of such assignments, agreements, documents, and instruments, as may be necessary or as the other Party may reasonably request in connection with this Agreement or to carry out more effectively the provisions and purposes hereof, or to better assure and confirm unto such other Party its rights and remedies under this Agreement.

11.14 Relationship of the Parties. It is expressly agreed that Gilead, on the one hand, and Precision, on the other hand, shall be independent contractors and that the relationship between the two Parties shall not constitute a partnership, joint venture, or agency. Neither Gilead, on the one hand, nor Precision, on the other hand, shall have the authority to make any statements, representations, or commitments of any kind, or to take any action, which shall be binding on the other, without the prior written consent of the other Party to do so. All persons employed by a Party shall be employees of such Party and not of the other Party and all costs and obligations incurred by reason of any such employment shall be for the account and expense of such Party.

11.15 Counterparts. This Agreement may be executed in two counterparts, and each such counterpart hereof shall be deemed to be an original instrument, but both such counterparts together shall constitute but one agreement. Delivery of an executed counterpart of a signature page of this Agreement by facsimile or other electronic transmission shall be effective as delivery of a manually executed original counterpart of this Agreement.

11.16 Schedules. In the event of any inconsistencies between this Agreement and any Schedules or other attachments hereto, the terms of this Agreement shall control.

11.17 Descriptive Headings; Certain Interpretations.

11.17.1 Descriptive headings are for convenience only and shall not control or affect the meaning or construction of any provision of this Agreement.

11.17.2 Except as otherwise expressly provided in this Agreement or as the context otherwise requires, the following rules of interpretation apply to this Agreement: (a) the singular includes the plural and the plural includes the singular; (b) “or” and “any” are not exclusive and the words “include” and “including,” and variations thereof, shall not be deemed to be terms of limitation, but rather shall be deemed to be followed by the words “without limitation;” (c) a reference to any contract includes permitted supplements and amendments; (d) a reference to Applicable Law includes any amendment or modification to such Applicable Law; (e) a reference to a Person includes its successors, heirs and permitted assigns; (f) a reference to one gender shall include any other gender; (g) a reference in this Agreement to an Article, Section, Exhibit or Schedule is to the referenced Article, Section, Exhibit or Schedule of this Agreement, unless expressly specified otherwise; (h) “hereunder,” “hereof,” and words of similar import shall be deemed references to this Agreement as a whole and not to any particular Article, Section or other provision; (i) “extent” in the phrase “to the extent” means the degree to which a subject or other thing extends, and such phrase does not mean simply “if” and (j) a reference to the right to “approve” includes the right to reject.

11.17.3 The Parties agree that they have been represented by counsel during the negotiation, drafting, preparation and execution of this Agreement and, therefore, waive the application of any Applicable Law or rule of construction providing that ambiguities in an agreement or other document shall be construed against the Party drafting such agreement or document.

[SIGNATURE PAGE FOLLOWS.]

THIS AGREEMENT IS EXECUTED by the authorized representatives of the Parties as of the date first written above.

GILEAD SCIENCES, INC.

By: /s/ John F. Milligan
Name: John F. Milligan
Title: President & Chief Executive Officer

PRECISION BIOSCIENCES, INC.

By: /s/ Matthew Kane
Name: Matthew Kane
Title: Chief Executive Officer

Schedule 1.45
Duke IP

Precision Docket No.	Country	Application No.	Patent No.	Status
[***]				
[***]	[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]	[***]
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[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Schedule 1.112
Precision Existing Patents

Precision Docket No.	Country	Application No.	Patent No.	Status
[***]				
[***]	[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]	[***]
[***]	[***]	[***]	[***]	[***]
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[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Precision Docket No.	Country	Application No.	Patent No.	Status
[***]	[***]	[***]	[***]	[***]
[***]	[***]	[***]		[***]
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[***]	[***]	[***]		[***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Schedule 1.113
Precision HBV Patents

Precision Docket No.	Country	Application No.	Patent No.	Status
[***]				
[***]	[***]	[***]		[***]
[***]	[***]	[***]		[***]
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[***]	[***]	[***]		[***]
[***]	[***]	[***]		[***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Schedule 2.1.2
Initial JSC Members

For Precision:

[***]

For Gilead:

[***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Schedule 2.2.1
Initial JRDC Members

For Precision:

[***]

For Gilead:

[***]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Schedule 3.8.3

Template Report

GILEAD SCIENCES - PRECISION BIOSCIENCES COLLABORATION REPORT

A. Preclinical R&D

- **Pre-Clinical R&D Progress: Months 1 – 6**

Executive Summary:

Include:

- Key strategic goals
- Milestones achieved
- GO/NO GO decisions
- Plan amendments (scope, timelines, resources, other)

Details:

Gilead Funding: [***]

Activity Goal	Activity Details	Activity Status	Timeline	Costs, FTEs (Budgeted/Actual)
1.				
2.				

- **Pre-Clinical R&D Progress: Months 7 – 12**

Executive Summary:

Include:

- Key strategic goals
- Milestones achieved
- GO/NO GO decisions
- Plan amendments (scope, timelines, resources, other)

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Details:

Gilead Funding: [***]

Activity Goal	Activity Details	Activity Status	Timeline	Costs, FTEs (Budgeted/Actual)
1.				
2.				

- **Pre-Clinical R&D Progress: Months 13 – 18**

Executive Summary:

Include:

- Key strategic goals
- Milestones achieved
- GO/NO GO decisions
- Plan amendments (scope, timelines, resources, other)

Details:

Gilead Funding: [***]

Activity Goal	Activity Details	Activity Status	Timeline	Costs, FTEs (Budgeted/Actual)
1.				
2.				

- **Pre-Clinical R&D Progress: Months 19 – 24**

Executive Summary:

Include:

- Key strategic goals
- Milestones achieved
- GO/NO GO decisions
- Plan amendments (scope, timelines, resources, other)

Details:

Gilead Funding: [***]

Activity Goal	Activity Details	Activity Status	Timeline	Costs, FTEs (Budgeted/Actual)
1.				
2.				

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

B. Clinical Development

- **Development and Regulatory Activities Progress**

Activity	Status	Details
Phase 1 Trial		
Phase 2 Trial		
Phase 3 Trial		

- **Development Milestones Progress (as described in Section 5.2.1 of the Agreement)**

Development Milestones	Status	Comments
[***]		
[***]		
[***]		
[***]		
[***]		

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

- **Commercialization Milestones Progress (as described in Section 5.3.1 of the Agreement)**

Commercial Milestones	Status	Comments
The first time aggregate global Net Sales of Licensed Products in a Calendar Year are equal to or greater than [***] and less [***]		
The first time aggregate global Net Sales of Licensed Products in a Calendar Year are equal to or greater than [***] and less [***]		
The first time aggregate global Net Sales of Licensed Products in a Calendar Year are equal to or greater than [***] and [***]		
The first time aggregate global Net Sales of Licensed Products in a Calendar Year are equal to or greater than [***]		

C. Functional Group Resource Allocation:

Representatives from the following functional groups worked on the program during this semiannual period:

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Schedule 5.1.2
Invoicing Template

[Company Name]

INVOICE

[Street Address]
[City, ST ZIP]
Phone: (000) 000-0000

INVOICE #	DATE
[123456]	5/1/2014

BILL TO
Accounts Payable
Gilead Sciences, Inc.
333 Lakeside Drive
Foster City, California 94404
APInvoices@gilead.com

DESCRIPTION	AMOUNT
Gilead Funding Commitment Pursuant to Section 5.1.1 of the Collaboration and License Agreement between Gilead Sciences, Inc. and Precision Biosciences, Inc. dated September 7, 2018, for the six (6) month period to .	XX
TOTAL	**$ XX**

Payment Terms: *Payment shall be due within [***] of receipt by Gilead.*

If you have any questions about this invoice, please contact
[Name, Phone, email@address.com]

[***] Confidential treatment requested pursuant to a request for confidential treatment filed with the Securities and Exchange Commission. Omitted portions have been filed separately with the Commission.

Schedule 6.2.8

ARCUS Patents and Precision Patents

Schedule to be provided upon the timing set forth in Section 6.2.8.

Schedule 7.4
Press Release(s)

Gilead & Precision Biosciences logos

CONTACTS: Sung Lee, Gilead Investors
650-524-7792

Amy Flood, Gilead Media
650-522-5643

Heather King, Precision Media
919-314-5512 x1332

GILEAD SCIENCES AND PRECISION BIOSCIENCES ANNOUNCE COLLABORATION TO DEVELOP THERAPIES AGAINST HEPATITIS B VIRUS USING ARCUS GENOME EDITING

FOSTER CITY, Calif. and DURHAM, NC, Sept XX, 2018 - Gilead Sciences (Nasdaq: GILD) and Precision Biosciences announced today that the companies have entered into a strategic collaboration to develop therapies targeting the *in vivo* elimination of hepatitis B virus (HBV) with Precision's proprietary genome editing platform, ARCUS.

An estimated 257 million people are living with HBV infection around the world. Current HBV treatments suppress HBV viral replication but do not completely clear the virus. The presence of covalently closed circular DNA (cccDNA) enables HBV replication if treatment is stopped. Preliminary studies at Gilead using ARCUS nucleases to target HBV cccDNA *in vitro* have demonstrated significant activity against cccDNA and integrated HBV DNA in human hepatocytes.

"Gilead is committed to developing innovative therapies to achieve functional cure for patients with chronic Hepatitis B virus infection," said John McHutchison, MD, Chief Scientific Officer and Head of Research and Development at Gilead. "We are excited about the potential of genome editing and Precision's ARCUS technology, which has demonstrated promising *in vitro* activity. We look forward to exploring this technology as an important component of our HBV cure research efforts."

Under the terms of the collaboration agreement, Precision will be primarily responsible for the development, formulation, and preclinical evaluation of the investigational nucleases, and Gilead will be responsible for the clinical development and commercialization of potential therapies. Gilead will fully fund the research and development. Precision is eligible to receive milestone payments of up to an aggregate of $445 million and tiered royalties that go up to the mid-teens for commercial products developed through the collaboration.

Precision Chief Scientific Officer Derek Jantz commented, "Gilead's cure-based approach to Hepatitis B is comprehensive and exciting. Precision is pleased that initial studies with our ARCUS platform have established an important role for genome editing in their HBV program. This is an excellent application for our technology, which has made notable progress toward therapeutic *in vivo* editing in relevant models over the last year."

- more -

About Precision BioSciences

Precision BioSciences is dedicated to improving life. Our mission is to cure genetic disease, overcome cancer, and feed the planet. We are striving to achieve this goal with ARCUS, our therapeutic-grade, naturally-derived genome editing system that combines both specificity and efficacy to help overcome life's greatest genetic challenges. For additional information, please visit www.precisionbiosciences.com

About Gilead Sciences

Gilead Sciences, Inc. is a research-based biopharmaceutical company that discovers, develops and commercializes innovative medicines in areas of unmet medical need. The company strives to transform and simplify care for people with life-threatening illnesses around the world. Gilead has operations in more than 35 countries worldwide, with headquarters in Foster City, California.

Gilead Forward-Looking Statement

This press release includes forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 that are subject to risks, uncertainties and other factors, including the risk that the parties may not realize the potential benefits of this collaboration. All statements other than statements of historical fact are statements that could be deemed forward-looking statements. These risks, uncertainties and other factors could cause actual results to differ materially from those referred to in the forward-looking statements. The reader is cautioned not to rely on these forward-looking statements. These and other risks are described in detail in Gilead's Annual Report on Form 10-K for the year ended December 31, 2017, as filed with the U.S. Securities and Exchange Commission. All forward-looking statements are based on information currently available to Gilead, and Gilead assumes no obligation to update any such forward-looking statements.

# # #

For more information on Gilead Sciences, please visit the company's website at www.gilead.com, follow Gilead on Twitter (@GileadSciences) or call Gilead Public Affairs at 1-800-GILEAD-5 or 1-650-574-3000.

Schedule 8.2.12
Precision IP Subject to U.S. Federal Government Rights

None.

Exhibit 10.8

PRECISION BIOSCIENCES, INC.

2006 STOCK INCENTIVE PLAN

1. Purpose

The purpose of this 2006 Stock Incentive Plan (the "Plan") of Precision BioSciences, Inc., a Delaware corporation (the "Company"), is to advance the interests of the Company's stockholders by enhancing the Company's ability to attract, retain and motivate persons who are expected to make important contributions to the Company and by providing such persons with equity ownership opportunities and performance-based incentives that are intended to align their interests with those of the Company's stockholders. Except where the context otherwise requires, the term "Company" shall include any of the Company's present or future parent or subsidiary corporations as defined in Sections 424(e) or (f) of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "Code") and any other business venture (including, without limitation, joint venture or limited liability company) in which the Company has a controlling interest, as determined by the Board of Directors of the Company (the "Board").

2. Eligibility

All of the Company's employees, officers, directors, consultants and advisors are eligible to receive options, restricted stock, restricted stock units and other stock-based awards (each, an "Award") under the Plan. Each person who receives an Award under the Plan is deemed a "Participant".

3. Administration and Delegation

(a) Administration by Board of Directors. The Plan will be administered by the Board. The Board shall have authority to grant Awards and to adopt, amend and repeal such administrative rules, guidelines and practices relating to the Plan as it shall deem advisable. The Board may correct any defect, supply any omission or reconcile any inconsistency in the Plan or any Award in the manner and to the extent it shall deem expedient to carry the Plan into effect and it shall be the sole and final judge of such expediency. All decisions by the Board shall be made in the Board's sole discretion and shall be final and binding on all persons having or claiming any interest in the Plan or in any Award. No director or person acting pursuant to the authority delegated by the Board shall be liable for any action or determination relating to or under the Plan made in good faith.

(b) Appointment of Committees. To the extent permitted by applicable law, the Board may delegate any or all of its powers under the Plan to one or more committees or subcommittees of the Board (a "Committee"). All references in the Plan to the "Board" shall mean the Board or a Committee of the Board to the extent that the Board's powers or authority under the Plan have been delegated to such Committee.

4. Stock Available for Awards. Subject to adjustment under Section 8, Awards may be made under the Plan for up to 200,000 shares of common stock, $0.0001 par value per share, of the Company (the "Common Stock"). If any Award expires or is terminated, surrendered or

canceled without having been fully exercised or is forfeited in whole or in part (including as the result of shares of Common Stock subject to such Award being repurchased by the Company at the original issuance price pursuant to a contractual repurchase right) or results in any Common Stock not being issued, the unused Common Stock covered by such Award shall again be available for the grant of Awards under the Plan. Further, shares of Common Stock tendered to the Company by a Participant to exercise an Award shall be added to the number of shares of Common Stock available for the grant of Awards under the Plan. However, in the case of Incentive Stock Options (as hereinafter defined), the foregoing provisions shall be subject to any limitations under the Code. Shares issued under the Plan may consist in whole or in part of authorized but unissued shares or treasury shares. At no time while there is any Option (as defined below) outstanding and held by a Participant who was a resident of the State of California on the date of grant of such Option, shall the total number of shares of Common Stock issuable upon exercise of all outstanding options and the total number of shares provided for under any stock bonus or similar plan of the Company exceed the applicable percentage as calculated in accordance with the conditions and exclusions of Section 260.140.45. of the California Code of Regulations (the "California Regulations"), based on the shares of the Company which are outstanding at the time the calculation is made.

5. Stock Options

(a) General. The Board may grant options to purchase Common Stock (each, an "Option") and determine the number of shares of Common Stock to be covered by each Option, the exercise price of each Option and the conditions and limitations applicable to the exercise of each Option, including conditions relating to applicable federal or state securities laws, as it considers necessary or advisable. An Option which is not intended to be an Incentive Stock Option (as hereinafter defined) shall be designated a "Nonstatutory Stock Option".

(b) Incentive Stock Options. An Option that the Board intends to be an "incentive stock option" as defined in Section 422 of the Code (an "Incentive Stock Option") shall only be granted to employees of Precision BioSciences, any of Precision BioSciences' present or future parent or subsidiary corporations as defined in Sections 424(e) or (f) of the Code, and any other entities the employees of which are eligible to receive Incentive Stock Options under the Code, and shall be subject to and shall be construed consistently with the requirements of Section 422 of the Code. The Company shall have no liability to a Participant, or any other party, if an Option (or any part thereof) that is intended to be an Incentive Stock Option is not an Incentive Stock Option or for any action taken by the Board pursuant to Section 9(f), including without limitation the conversion of an Incentive Stock Option to a Nonstatutory Stock Option.

(c) Exercise Price. The Board shall establish the exercise price of each Option and specify such exercise price in the applicable option agreement.

(d) Duration of Options. Each Option shall be exercisable at such times and subject to such terms and conditions as the Board may specify in the applicable option agreement.

(e) Exercise of Option. Options may be exercised by delivery to the Company of a written notice of exercise signed by the proper person or by any other form of notice (including electronic notice) approved by the Board together with payment in full as specified in Section

5(f) for the number of shares for which the Option is exercised. Shares of Common Stock subject to the Option will be delivered by the Company following exercise either as soon as practicable or, subject to such conditions as the Board shall specify, on a deferred basis (with the Company's obligation to be evidenced by an instrument providing for future delivery of the deferred shares at the time or times specified by the Board).

(f) Payment Upon Exercise. Common Stock purchased upon the exercise of an Option granted under the Plan shall be paid for as follows:

(1) in cash or by check, payable to the order of the Company;

(2) except as the Board may otherwise provide in an option agreement, by (i) delivery of an irrevocable and unconditional undertaking by a creditworthy broker to deliver promptly to the Company sufficient funds to pay the exercise price and any required tax withholding or (ii) delivery by the Participant to the Company of a copy of irrevocable and unconditional instructions to a creditworthy broker to delivery promptly to the Company cash or a check sufficient to pay the exercise price and any required tax withholding;

(3) when the Common Stock is registered under the Exchange Act, by delivery of shares of Common Stock owned by the Participant valued at their fair market value as determined by (or in a manner approved by) the Board ("Fair Market Value"), provided (i) such method of payment is then permitted under applicable law, (ii) such Common Stock, if acquired directly from the Company, was owned by the Participant for such minimum period of time, if any, as may be established by the Board in its discretion and (iii) such Common Stock is not subject to any repurchase, forfeiture, unfulfilled vesting or other similar requirements;

(4) to the extent permitted by applicable law and by the Board, by (i) delivery of a promissory note of the Participant to the Company on terms determined by the Board, or (ii) payment of such other lawful consideration as the Board may determine; or

(5) by any combination of the above permitted forms of payment.

(g) Substitute Options. In connection with a merger or consolidation of an entity with the Company or the acquisition by the Company of property or stock of an entity, the Board may grant Options in substitution for any options or other stock or stock-based awards granted by such entity or an affiliate thereof. Substitute Options may be granted on such terms as the Board deems appropriate in the circumstances, notwithstanding any limitations on Options contained in the other sections of this Section 5 or in Section 2. Substitute Options shall not count against the overall share limit set forth in Section 4(a), except as may be required by reason of Section 422 and related provisions of the Code.

6. Restricted Stock; Restricted Stock Units

(a) General. The Board may grant Awards entitling recipients to acquire shares of Common Stock ("Restricted Stock"), subject to the right of the Company to repurchase all or part of such shares at their issue price or other stated or formula price (or to require forfeiture of such shares if issued at no cost) from the recipient in the event that conditions specified by the Board in the applicable Award are not satisfied prior to the end of the applicable restriction

period or periods established by the Board for such Award. Instead of granting Awards for Restricted Stock, the Board may grant Awards entitling the recipient to receive shares of Common Stock to be delivered at the time such shares of Common Stock vest ("Restricted Stock Units") (Restricted Stock and Restricted Stock Units are each referred to herein as a "Restricted Stock Award").

(b) Terms and Conditions. The Board shall determine the terms and conditions of a Restricted Stock Award, including the conditions for repurchase (or forfeiture) and the issue price, if any.

(c) Stock Certificates. Any stock certificates issued in respect of a Restricted Stock Award shall be registered in the name of the Participant and, unless otherwise determined by the Board, deposited by the Participant, together with a stock power endorsed in blank, with the Company (or its designee). At the expiration of the applicable restriction periods, the Company (or such designee) shall deliver the certificates no longer subject to such restrictions to the Participant or if the Participant has died, to the beneficiary designated, in a manner determined by the Board, by a Participant to receive amounts due or exercise rights of the Participant in the event of the Participant's death (the "Designated Beneficiary"). In the absence of an effective designation by a Participant, "Designated Beneficiary" shall mean the Participant's estate.

7. Other Stock-Based Awards

Other Awards of shares of Common Stock, and other Awards that are valued in whole or in part by reference to, or are otherwise based on, shares of Common Stock or other property, may be granted hereunder to Participants ("Other Stock Unit Awards"), including without limitation stock appreciation rights and Awards entitling recipients to receive shares of Common Stock to be delivered in the future. Such Other Stock Unit Awards shall also be available as a form of payment in the settlement of other Awards granted under the Plan or as payment in lieu of compensation to which a Participant is otherwise entitled. Other Stock Unit Awards may be paid in shares of Common Stock or cash, as the Board shall determine. Subject to the provisions of the Plan, the Board shall determine the conditions of each Other Stock Unit Award, including any purchase price applicable thereto.

8. Adjustments for Changes in Common Stock and Certain Other Events

(a) Changes in Capitalization. In the event of any stock split, reverse stock split, stock dividend, recapitalization, combination of shares, reclassification of shares, spin-off or other similar change in capitalization or event, or any distribution to holders of Common Stock other than an ordinary cash dividend, (i) the number and class of securities available under this Plan, (ii) the number and class of securities and exercise price per share of each outstanding Option, (iii) the repurchase price per share subject to each outstanding Restricted Stock Award, and (iv) the terms of each other outstanding Award shall be appropriately adjusted by the Company (or substituted Awards may be made, if applicable) to the extent determined by the Board.

(b) Reorganization Events

(1) Definition. A "Reorganization Event" shall mean: (a) any merger or consolidation of the Company with or into another entity as a result of which all of the Common Stock of the Company is converted into or exchanged for the right to receive cash, securities or other property or is cancelled, (b) any exchange of all of the Common Stock of the Company for cash, securities or other property pursuant to a share exchange transaction or (c) any liquidation or dissolution of the Company.

(2) Consequences of a Reorganization Event on Awards Other than Restricted Stock Awards. In connection with a Reorganization Event, the Board shall take any one or more of the following actions as to all or any outstanding Awards on such terms as the Board determines: (i) provide that Awards shall be assumed, or substantially equivalent Awards shall be substituted, by the acquiring or succeeding corporation (or an affiliate thereof), (ii) upon written notice to a Participant, provide that the Participant's unexercised Options or other unexercised Awards shall become exercisable in full and will terminate immediately prior to the consummation of such Reorganization Event unless exercised by the Participant within a specified period following the date of such notice, (iii) provide that outstanding Awards shall become realizable or deliverable, or restrictions applicable to an Award shall lapse, in whole or in part prior to or upon such Reorganization Event, (iv) in the event of a Reorganization Event under the terms of which holders of Common Stock will receive upon consummation thereof a cash payment for each share surrendered in the Reorganization Event (the "Acquisition Price"), make or provide for a cash payment to a Participant equal to (A) the Acquisition Price times the number of shares of Common Stock subject to the Participant's Options or other Awards (to the extent the exercise price does not exceed the Acquisition Price) minus (B) the aggregate exercise price of all such outstanding Options or other Awards, in exchange for the termination of such Options or other Awards, (v) provide that, in connection with a liquidation or dissolution of the Company, Awards shall convert into the right to receive liquidation proceeds (if applicable, net of the exercise price thereof) and (vi) any combination of the foregoing.

For purposes of clause (i) above, an Option shall be considered assumed if, following consummation of the Reorganization Event, the Option confers the right to purchase, for each share of Common Stock subject to the Option immediately prior to the consummation of the Reorganization Event, the consideration (whether cash, securities or other property) received as a result of the Reorganization Event by holders of Common Stock for each share of Common Stock held immediately prior to the consummation of the Reorganization Event (and if holders were offered a choice of consideration, the type of consideration chosen by the holders of a majority of the outstanding shares of Common Stock); provided, however, that if the consideration received as a result of the Reorganization Event is not solely common stock of the acquiring or succeeding corporation (or an affiliate thereof), the Company may, with the consent of the acquiring or succeeding corporation, provide for the consideration to be received upon the exercise of Options to consist solely of common stock of the acquiring or succeeding corporation (or an affiliate thereof) equivalent value (as determined by the Board) to the per share consideration received by holders of outstanding shares of Common Stock as a result of the Reorganization Event.

To the extent all or any portion of an Option becomes exercisable solely as a result of clause (ii) above, the Board may provide that upon exercise of such Option the Participant shall receive shares subject to a right of repurchase by the Company or its successor

at the Option exercise price; such repurchase right (x) shall lapse at the same rate as the Option would have become exercisable under its terms and (y) shall not apply to any shares subject to the Option that were exercisable under its terms without regard to clause (ii) above.

(3) Consequences of a Reorganization Event on Restricted Stock Awards. Upon the occurrence of a Reorganization Event other than a liquidation or dissolution of the Company, the repurchase and other rights of the Company under each outstanding Restricted Stock Award shall inure to the benefit of the Company's successor and shall apply to the cash, securities or other property which the Common Stock was converted into or exchanged for pursuant to such Reorganization Event in the same manner and to the same extent as they applied to the Common Stock subject to such Restricted Stock Award. Upon the occurrence of a Reorganization Event involving the liquidation or dissolution of the Company, except to the extent specifically provided to the contrary in the instrument evidencing any Restricted Stock Award or any other agreement between a Participant and the Company, all restrictions and conditions on all Restricted Stock Awards then outstanding shall automatically be deemed terminated or satisfied.

9. General Provisions Applicable to Awards

(a) Transferability of Awards. Except as the Board may otherwise determine or provide in an Award, Awards shall not be sold, assigned, transferred, pledged or otherwise encumbered by the person to whom they are granted, either voluntarily or by operation of law, except by will or the laws of descent and distribution or, other than in the case of an Incentive Stock Option, pursuant to a qualified domestic relations order, and, during the life of the Participant, shall be exercisable only by the Participant. References to a Participant, to the extent relevant in the context, shall include references to authorized transferees.

(b) Documentation. Each Award shall be evidenced in such form (written, electronic or otherwise) as the Board shall determine. Each Award may contain terms and conditions in addition to those set forth in the Plan.

(c) Board Discretion. Except as otherwise provided by the Plan, each Award may be made alone or in addition or in relation to any other Award. The terms of each Award need not be identical, and the Board need not treat Participants uniformly.

(d) Termination of Status. The Board shall determine the effect on an Award of the disability, death, retirement, authorized leave of absence or other change in the employment or other status of a Participant and the extent to which, and the period during which, the Participant, or the Participant's legal representative, conservator, guardian or Designated Beneficiary, may exercise rights under the Award.

(e) Withholding. Each Participant shall pay to the Company, or make provision satisfactory to the Company for payment of, any taxes required by law to be withheld in connection with an Award to such Participant. Except as the Board may otherwise provide in an Award, for so long as the Common Stock is registered under the Exchange Act, Participants may satisfy such tax obligations in whole or in part by delivery of shares of Common Stock, including shares retained from the Award creating the tax obligation, valued at their Fair Market Value;

provided, however, except as otherwise provided by the Board, that the total tax withholding where stock is being used to satisfy such tax obligations cannot exceed the Company's minimum statutory withholding obligations (based on minimum statutory withholding rates for federal and state tax purposes, including payroll taxes, that are applicable to such supplemental taxable income). Shares surrendered to satisfy tax withholding requirements cannot be subject to any repurchase, forfeiture, unfulfilled vesting or other similar requirements. The Company may, to the extent permitted by law, deduct any such tax obligations from any payment of any kind otherwise due to a Participant.

(f) Amendment of Award. The Board may amend, modify or terminate any outstanding Award, including but not limited to, substituting therefor another Award of the same or a different type, changing the date of exercise or realization, and converting an Incentive Stock Option to a Nonstatutory Stock Option, provided that the Participant's consent to such action shall be required unless the Board determines that the action, taking into account any related action, would not materially and adversely affect the Participant.

(g) Conditions on Delivery of Stock. The Company will not be obligated to deliver any shares of Common Stock pursuant to the Plan or to remove restrictions from shares previously delivered under the Plan until (i) all conditions of the Award have been met or removed to the satisfaction of the Company, (ii) in the opinion of the Company's counsel, all other legal matters in connection with the issuance and delivery of such shares have been satisfied, including any applicable securities laws and any applicable stock exchange or stock market rules and regulations, and (iii) the Participant has executed and delivered to the Company such representations or agreements as the Company may consider appropriate to satisfy the requirements of any applicable laws, rules or regulations.

(h) Acceleration. The Board may at any time provide that any Award shall become immediately exercisable in full or in part, free of some or all restrictions or conditions, or otherwise realizable in full or in part, as the case may be.

10. Miscellaneous

(a) No Right To Employment or Other Status. No person shall have any claim or right to be granted an Award, and the grant of an Award shall not be construed as giving a Participant the right to continued employment or any other relationship with the Company. The Company expressly reserves the right at any time to dismiss or otherwise terminate its relationship with a Participant free from any liability or claim under the Plan, except as expressly provided in the applicable Award.

(b) No Rights As Stockholder. Subject to the provisions of the applicable Award, no Participant or Designated Beneficiary shall have any rights as a stockholder with respect to any shares of Common Stock to be distributed with respect to an Award until becoming the record holder of such shares. Notwithstanding the foregoing, in the event the Company effects a split of the Common Stock by means of a stock dividend and the exercise price of and the number of shares subject to such Option are adjusted as of the date of the distribution of the dividend (rather than as of the record date for such dividend), then an optionee who exercises an Option between the record date and the distribution date for such stock dividend shall be entitled to receive, on

the distribution date, the stock dividend with respect to the shares of Common Stock acquired upon such Option exercise, notwithstanding the fact that such shares were not outstanding as of the close of business on the record date for such stock dividend.

(c) Effective Date and Term of Plan. The Plan shall become effective on the date on which it is adopted by the Board. No Awards shall be granted under the Plan after the completion of 10 years from the earlier of (i) the date on which the Plan was adopted by the Board or (ii) the date the Plan was approved by the Company's stockholders, but Awards previously granted may extend beyond that date.

(d) Amendment of Plan. The Board may amend, suspend or terminate the Plan or any portion thereof at any time.

(e) Authorization of Sub-Plans. The Board may from time to time establish one or more sub-plans under the Plan for purposes of satisfying applicable blue sky, securities or tax laws of various jurisdictions. The Board shall establish such sub-plans by adopting supplements to this Plan containing (i) such limitations on the Board's discretion under the Plan as the Board deems necessary or desirable or (ii) such additional terms and conditions not otherwise inconsistent with the Plan as the Board shall deem necessary or desirable. All supplements adopted by the Board shall be deemed to be part of the Plan, but each supplement shall apply only to Participants within the affected jurisdiction and the Company shall not be required to provide copies of any supplement to Participants in any jurisdiction which is not the subject of such supplement.

(f) Compliance with Code Section 409A. No Award shall provide for deferral of compensation that does not comply with Section 409A of the Code, unless the Board, at the time of grant, specifically provides that the Award is not intended to comply with Section 409A of the Code.

(g) Governing Law. The provisions of the Plan and all Awards made hereunder shall be governed by and interpreted in accordance with the laws of the State of Delaware, excluding choice-of-law principles of the law of such state that would require the application of the laws of a jurisdiction other than such state.

PRECISION BIOSCIENCES, INC.

2006 STOCK INCENTIVE PLAN

CALIFORNIA SUPPLEMENT

Pursuant to Section 10(e) of the Plan, the Board has adopted this supplement for purposes of satisfying the requirements of Section 25102(o) of the California Law:

Any Awards granted under the Plan to a Participant who is a resident of the State of California on the date of grant (a "California Participant") shall be subject to the following additional limitations, terms and conditions:

1. Additional Limitations on Options.

(a) Minimum Vesting Rate. Except in the case of Options granted to California Participants who are officers, directors, managers, consultants or advisors of the Company or its affiliates (which Options may become exercisable at whatever rate is determined by the Board), Options granted to California Participants shall become exercisable at a rate of no less than 20% per year over five years from the date of grant; provided, that, such Options may be subject to such reasonable forfeiture conditions as the Board may choose to impose and which are not inconsistent with Section 260.140.41 of the California Regulations.

(b) Minimum Exercise Price. The exercise price of Options granted to California Participants may not be less than 85% of the Fair Market Value of the Common Stock on the date of grant in the case of a Nonstatutory Stock Option or less than 100% of the Fair Market Value of the Common Stock on the date of grant in the case of an Incentive Stock Option; provided, however, that if the California Participant is a person who owns stock possessing more than 10% of the total combined voting power of all classes of stock of the Company or its parent or subsidiary corporations, the exercise price shall be not less than 110% of the Fair Market Value of the Common Stock on the date of grant.

(c) Maximum Duration of Options. No Options granted to California Participants will be granted for a term in excess of 10 years.

(d) Minimum Exercise Period Following Termination. Unless a California Participant's employment is terminated for cause (as defined in any contract of employment between the Company and such Participant, or if none, in the instrument evidencing the grant of such Participant's Option), in the event of termination of employment of such Participant, he or she shall have the right to exercise an Option, to the extent that he or she was otherwise entitled to exercise such Option on the date employment terminated, as follows: (i) at least six months from the date of termination, if termination was caused by such Participant's death or "permanent and total disability" (within the meaning of Section 22(e)(3) of the Code) and (ii) at least 30 days from the date of termination, if termination was caused other than by such Participant's death or "permanent and total disability" (within the meaning of Section 22(e)(3) of the Code).

(e) Limitation on Repurchase Rights. If an Option granted to a California Participant gives the Company the right to repurchase shares of Common Stock issued pursuant to the Plan upon termination of employment of such Participant, the terms of such repurchase right must comply with Section 260.140.41(k) of the California Regulations.

2. Additional Limitations for Restricted Stock Awards.

(a) Minimum Purchase Price. The purchase price for a Restricted Stock Award granted to a California Participant shall be not less than 85% of the Fair Market Value of the Common Stock at the time such Participant is granted the right to purchase shares under the Plan or at the time the purchase is consummated; provided, however, that if such Participant is a person who owns stock possessing more than 10% of the total combined voting power or value of all classes of stock of the Company or its parent or subsidiary corporations, the purchase price shall be not less than 100% of the Fair Market Value of the Common Stock at the time such Participant is granted the right to purchase shares under the Plan or at the time the purchase is consummated.

(b) Limitation of Repurchase Rights. If a Restricted Stock Award granted to a California Participant gives the Company the right to repurchase shares of Common Stock issued pursuant to the Plan upon termination of employment of such Participant, the terms of such repurchase right must comply with Section 260.140.42(h) of the California Regulations.

3. Additional Limitations for Other Stock-Based Awards. The terms of all Awards granted to a California Participant under Section 7 of the Plan shall comply, to the extent applicable, with Section 260.140.41 or Section 260.140.42 of the California Regulations.

4. Additional Requirement to Provide Information to California Participants. The Company shall provide to each California Participant and to each California Participant who acquires Common Stock pursuant to the Plan, not less frequently than annually, copies of annual financial statements (which need not be audited). The Company shall not be required to provide such statements to key employees whose duties in connection with the Company assure their access to equivalent information.

5. Additional Limitations on Timing of Awards. No Award granted to a California Participant shall become exercisable, vested or realizable, as applicable to such Award, unless the Plan has been approved by a majority of the Company's stockholders within 12 months before or after the date the Plan was adopted by the Board.

6. Additional Limitations Relating to Definition of Fair Market Value. For purposes of Section 1(b) and 2(a) of this supplement, "Fair Market Value" shall be determined in a manner not inconsistent with Section 260.140.50 of the California Regulations.

7. Additional Restriction Regarding Recapitalizations, Stock Splits, Etc. For purposes of Section 8 of the Plan, in the event of a stock split, reverse stock split, stock dividend, recapitalization, combination, reclassification or other distribution of the Company's securities, the number of securities allocated to each California Participant must be adjusted proportionately and without the receipt by the Company of any consideration from any California Participant.

PRECISION BIOSCIENCES, INC.
FIRST AMENDMENT OF 2006 STOCK INCENTIVE PLAN

THIS FIRST AMENDMENT of Precision Biosciences, Inc. 2006 Stock Incentive Plan is dated as of December 8, 2010.

WHEREAS, the Board of Directors of Precision Biosciences, Inc. (the "**Company**") has adopted and the stockholders of the Company have approved the Precision Biosciences, Inc. 2006 Stock Incentive Plan (the "**Plan**"); and

WHEREAS, the Board of Directors determines that it is in the best interests of the Company to amend the Plan in order to increase the number of shares of common stock issuable pursuant to options granted under the Plan (the "**Shares**") from Two Hundred Thousand (200,000) shares to Four Hundred Fifty Thousand (450,000) shares and to make such other amendments as set forth below.

NOW, THEREFORE, the Plan shall be amended as follows:

1. The first sentence of Section 4 of the Plan is hereby deleted in its entirety and the following substituted in lieu thereof:

> "Subject to adjustment under Section 8, Awards may be made under the Plan for up to 450,000 shares of common stock, $0.0001 par value per share, of the Company (the "Common Stock")."

Section 4 of the Plan is hereby further amended to delete the fourth sentence of such section (beginning with the word "However") and the following is substituted in lieu thereof:

> "Notwithstanding the above, if an Option (as defined below) should expire or become unexerciseable or otherwise terminate for any reason without having been exercised in full, the unpurchased Shares which were subject thereto shall not return to this Plan and shall not become available for other Options under this Plan and shall instead be immediately canceled."

2. Section 3(a) of the Plan is hereby amended to add the following immediately after the second sentence of such section:

> "In addition, the Board shall have the authority to: (a) interpret this Plan, the Awards and any agreement entered into with respect to the grant or exercise of Awards (including Options); (b) to authorize any person to execute on behalf of the Company any instrument required to effectuate the grant of an Award or to take such action as may be necessary or appropriate with respect to the Company's rights pursuant to Awards or agreements relating to the grant or exercise thereof; and (c) to make such other terminations and establish such other procedures as it deems necessary or advisable for the administration of the Plan."

3. Section 8(b)(1) of the Plan is hereby deleted in its entirety and the following substituted in lieu thereof:

"(1) Definition. A "Reorganization Event" shall mean one of the following events: (a) the merger, consolidation or other reorganization of the Company in which the outstanding Common Stock is converted into or exchanged for a different class of securities of the Company, a class of securities of any other issuer (except a parent or subsidiary of the Company), cash or other property; (b) the sale, lease or exchange of all or substantially all of the assets of the Company to any other corporation or entity (except a parent or subsidiary of the Company); or (c) the adoption by stockholders of the Company of a plan of liquidation or dissolution. Notwithstanding the above, a Reorganization Event shall not include a merger, consolidation or reorganization of the Company in which no person acquires more than fifty percent (50%) of the combined voting power of the Company's then outstanding stock."

4. Section 8(b)(3) of the Plan is hereby deleted in its entirety and the following substituted in lieu thereof:

"Upon the occurrence of a Reorganization Event, except to the extent specifically provided to the contrary in the instrument evidencing any Restricted Stock Award or any other agreement between a participant and the Company, all restrictions and conditions on all Restricted Stock Awards or Awards under any other such agreements then outstanding shall automatically be deemed terminated or satisfied."

5. Except as herein amended, the terms and provisions of the Plan shall remain in full force and effect as originally adopted and approved.

IN WITNESS WHEREOF, the undersigned hereby certifies that this First Amendment was duly adopted by the Board of Directors of the Company as of December 8, 2010.

PRECISION BIOSCIENCES, INC.

By: /s/Matt Kane
Name: Matt Kane
Title: CEO

PRECISION BIOSCIENCES, INC.

Incentive Stock Option Agreement
Granted Under 2006 Stock Incentive Plan

1. Grant of Option.

This agreement evidences the grant by Precision BioSciences, Inc., a Delaware corporation (the "Company"), on , 200[ ] (the "Grant Date") to [ ] an employee of the Company (the "Participant"), of an option to purchase, in whole or in part, on the terms provided herein and in the Company's 2006 Stock Incentive Plan (the "Plan"), a total of [ ] shares (the "Shares") of common stock, $0.0001 par value per share, of the Company ("Common Stock") at $ per Share.[1] Unless earlier terminated, this option shall expire at 5:00 p.m., Eastern time, on (the "Final Exercise Date").[2]

It is intended that the option evidenced by this agreement shall be an incentive stock option as defined in Section 422 of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "Code"). Except as otherwise indicated by the context, the term "Participant", as used in this option, shall be deemed to include any person who acquires the right to exercise this option validly under its terms.

2. Vesting Schedule.

This option will become exercisable ("vest") as to % of the original number of Shares on the [first] anniversary of the Grant Date and as to an additional % of the original number of Shares at the end of each successive [three-month] period following the first anniversary of the Grant Date until the [fourth] anniversary of the Grant Date.

The right of exercise shall be cumulative so that to the extent the option is not exercised in any period to the maximum extent permissible it shall continue to be exercisable, in whole or in part, with respect to all Shares for which it is vested until the earlier of the Final Exercise Date or the termination of this option under Section 3 hereof or the Plan.

3. Exercise of Option.

(a) Form of Exercise. Each election to exercise this option shall be in writing, signed by the Participant, and received by the Company at its principal office, accompanied by this agreement, and payment in full in the manner provided in the Plan. The Participant may

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1 This must be at least 100% of the fair market value of the Common Stock on the date of grant (or 110% in the case of a Participant that owns more than 10% of the total combined voting power of all classes of stock of the Company or its parent or subsidiary (a "10% Shareholder")) for the option to qualify as an incentive stock option (an "ISO") under Section 422 of the Code.

2 The Final Exercise Date must be no more than 10 years (5 years in the case of a 10% Shareholder) from the date of grant for the option to qualify as an ISO. The correct approach to calculate the final exercise date is to use the day immediately prior to the date ten years out from the date of the stock option award grant (5 years in the case of a 10% stockholder). For example, an award granted to someone on October 1, 2001 would expire on September 30, 2011 (not on October 1, 2011).

purchase less than the number of shares covered hereby, provided that no partial exercise of this option may be for any fractional share or for fewer than ten whole shares.

(b) Continuous Relationship with the Company Required. Except as otherwise provided in this Section 3, this option may not be exercised unless the Participant, at the time he or she exercises this option, is, and has been at all times since the Grant Date, an employee or officer of, or consultant or advisor to, the Company or any parent or subsidiary of the Company as defined in Section 424(e) or (f) of the Code (an "Eligible Participant").

(c) Termination of Relationship with the Company. If the Participant ceases to be an Eligible Participant for any reason, then, except as provided in paragraphs (d) and (e) below, the right to exercise this option shall terminate three months after such cessation (but in no event after the Final Exercise Date), provided that this option shall be exercisable only to the extent that the Participant was entitled to exercise this option on the date of such cessation. Notwithstanding the foregoing, if the Participant, prior to the Final Exercise Date, violates the non-competition or confidentiality provisions of any employment contract, confidentiality and nondisclosure agreement or other agreement between the Participant and the Company, the right to exercise this option shall terminate immediately upon written notice to the Participant from the Company describing such violation.

(d) Exercise Period Upon Death or Disability. If the Participant dies or becomes disabled (within the meaning of Section 22(e)(3) of the Code) prior to the Final Exercise Date while he or she is an Eligible Participant and the Company has not terminated such relationship for "cause" as specified in paragraph (e) below, this option shall be exercisable, within the period of one year following the date of death or disability of the Participant, by the Participant (or in the case of death by an authorized transferee), provided that this option shall be exercisable only to the extent that this option was exercisable by the Participant on the date of his or her death or disability, and further provided that this option shall not be exercisable after the Final Exercise Date.

(e) Termination for Cause. If, prior to the Final Exercise Date, the Participant's employment is terminated by the Company for Cause (as defined below), the right to exercise this option shall terminate immediately upon the effective date of such termination of employment. If, prior to the Final Exercise Date, the Participant is given notice by the Company of the termination of his or her employment by the Company for Cause, and the effective date of such employment termination is subsequent to the date of delivery of such notice, the right to exercise this option shall be suspended from the time of the delivery of such notice until the earlier of (i) such time as it is determined or otherwise agreed that the Participant's employment shall not be terminated for Cause as provided in such notice or (ii) the effective date of such termination of employment (in which case the right to exercise this option shall, pursuant to the preceding sentence, terminate upon the effective date of such termination of employment). If the Participant is party to an employment or severance agreement with the Company that contains a definition of "cause" for termination of employment, "Cause" shall have the meaning ascribed to such term in such agreement. Otherwise, "Cause" shall mean willful misconduct by the Participant or willful failure by the Participant to perform his or her responsibilities to the Company (including, without limitation, breach by the Participant of any provision of any employment, consulting, advisory, nondisclosure, non-competition or other similar agreement

between the Participant and the Company), as determined by the Company, which determination shall be conclusive. The Participant shall be considered to have been discharged for Cause if the Company determines, within 30 days after the Participant's resignation, that discharge for cause was warranted.

4. Company Right of First Refusal.

(a) Notice of Proposed Transfer. If the Participant proposes to sell, assign, transfer, pledge, hypothecate or otherwise dispose of, by operation of law or otherwise (collectively, "transfer") any Shares acquired upon exercise of this option, then the Participant shall first give written notice of the proposed transfer (the "Transfer Notice") to the Company. The Transfer Notice shall name the proposed transferee and state the number of such Shares the Participant proposes to transfer (the "Offered Shares"), the price per share and all other material terms and conditions of the transfer.

(b) Company Right to Purchase. For 30 days following its receipt of such Transfer Notice, the Company shall have the option to purchase all or part of the Offered Shares at the price and upon the terms set forth in the Transfer Notice. In the event the Company elects to purchase all or part of the Offered Shares, it shall give written notice of such election to the Participant within such 30-day period. Within 10 days after his or her receipt of such notice, the Participant shall tender to the Company at its principal offices the certificate or certificates representing the Offered Shares to be purchased by the Company, duly endorsed in blank by the Participant or with duly endorsed stock powers attached thereto, all in a form suitable for transfer of the Offered Shares to the Company. Promptly following receipt of such certificate or certificates, the Company shall deliver or mail to the Participant a check in payment of the purchase price for such Offered Shares; provided that if the terms of payment set forth in the Transfer Notice were other than cash against delivery, the Company may pay for the Offered Shares on the same terms and conditions as were set forth in the Transfer Notice; and provided further that any delay in making such payment shall not invalidate the Company's exercise of its option to purchase the Offered Shares.

(c) Shares Not Purchased By Company. If the Company does not elect to acquire all of the Offered Shares, the Participant may, within the 30-day period following the expiration of the option granted to the Company under subsection (b) above, transfer the Offered Shares which the Company has not elected to acquire to the proposed transferee, provided that such transfer shall not be on terms and conditions more favorable to the transferee than those contained in the Transfer Notice. Notwithstanding any of the above, all Offered Shares transferred pursuant to this Section 4 shall remain subject to the right of first refusal set forth in this Section 4 and such transferee shall, as a condition to such transfer, deliver to the Company a written instrument confirming that such transferee shall be bound by all of the terms and conditions of this Section 4.

(d) Consequences of Non-Delivery. After the time at which the Offered Shares are required to be delivered to the Company for transfer to the Company pursuant to subsection (b) above, the Company shall not pay any dividend to the Participant on account of such Offered Shares or permit the Participant to exercise any of the privileges or rights of a stockholder with

respect to such Offered Shares, but shall, insofar as permitted by law, treat the Company as the owner of such Offered Shares.

(e) Exempt Transactions. The following transactions shall be exempt from the provisions of this Section 4:

(1) any transfer of Shares to or for the benefit of any spouse, child, parent, uncle, aunt, sibling, mother or father-in law, sister or brother-in-law or grandchild of the Participant, or any other relatives of the Participant approved by the Board of Directors (collectively, "Approved Relatives") or to a trust established solely for the benefit of the Participant and/or Approved Relatives;

(2) any transfer pursuant to an effective registration statement filed by the Company under the Securities Act of 1933, as amended (the "Securities Act"); and

(3) the sale of all or substantially all of the shares of capital stock of the Company (including pursuant to a merger or consolidation);

provided, however, that in the case of a transfer pursuant to clause (1) above, such Shares shall remain subject to the right of first refusal set forth in this Section 4 and such transferee shall, as a condition to such transfer, deliver to the Company a written instrument confirming that such transferee shall be bound by all of the terms and conditions of this Section 4.

(f) Assignment of Company Right. The Company may assign its rights to purchase Offered Shares in any particular transaction under this Section 4 to one or more persons or entities.

(g) Termination. The provisions of this Section 4 shall terminate upon the earlier of the following events:

(1) the closing of the sale of shares of Common Stock in an underwritten public offering pursuant to an effective registration statement filed by the Company under the Securities Act; or

(2) the sale of all or substantially all of the capital stock, assets or business of the Company, by merger, consolidation, sale of assets or otherwise (other than a merger or consolidation in which all or substantially all of the individuals and entities who were beneficial owners of the Common Stock immediately prior to such transaction beneficially own, directly or indirectly, more than 50% of the outstanding securities entitled to vote generally in the election of directors of the resulting, surviving or acquiring corporation in such transaction).

(h) No Obligation to Recognize Invalid Transfer. The Company shall not be required (1) to transfer on its books any of the Shares which shall have been sold or transferred in violation of any of the provisions set forth in this Section 4, or (2) to treat as owner of such Shares or to pay dividends to any transferee to whom any such Shares shall have been so sold or transferred.

(i) Legends. The certificate representing Shares shall bear a legend substantially in the following form (in addition to, or in combination with, any legend required by applicable federal and state securities laws and agreements relating to the transfer of the Company securities):

> "The shares represented by this certificate are subject to a right of first refusal in favor of the Company, as provided in a certain stock option agreement with the Company."

5. Agreement in Connection with Public Offering.

The Participant agrees, in connection with the initial underwritten public offering of the Company's securities pursuant to a registration statement under the Securities Act, (i) not to sell, make short sale of, loan, grant any options for the purchase of, or otherwise dispose of any shares of Common Stock held by the Participant (other than those shares included in the offering) without the prior written consent of the Company or the underwriters managing such initial underwritten public offering of the Company's securities for a period of 180 days from the effective date of such registration statement, and (ii) to execute any agreement reflecting clause (i) above as may be requested by the Company or the managing underwriters at the time of such offering.

6. Tax Matters.

(a) Withholding. No Shares will be issued pursuant to the exercise of this option unless and until the Participant pays to the Company, or makes provision satisfactory to the Company for payment of, any federal, state or local withholding taxes required by law to be withheld in respect of this option.

(b) Disqualifying Disposition. If the Participant disposes of Shares acquired upon exercise of this option within two years from the Grant Date or one year after such Shares were acquired pursuant to exercise of this option, the Participant shall notify the Company in writing of such disposition.

7. Nontransferability of Option.

This option-may not be sold, assigned, transferred, pledged or otherwise encumbered by the Participant, either voluntarily or by operation of law, except by will or the laws of descent and distribution, and, during the lifetime of the Participant, this option shall be exercisable only by the Participant.

8. Provisions of the Plan.

This option is subject to the provisions of the Plan, a copy of which is furnished to the Participant with this option.

IN WITNESS WHEREOF, the Company has caused this option to be executed under its corporate seal by its duly authorized officer. This option shall take effect as a sealed instrument.

PRECISION BIOSCIENCES, INC.

Dated: _____

By: _____

Name: _____

Title: _____

NOTICE OF STOCK OPTION EXERCISE

Date: _____

Precision BioSciences, Inc.
2225 Gentry Drive
Durham, NC 27705

Attention: Treasurer

Dear Sir or Madam:

I am the holder of an Incentive Stock Option granted to me under the Precision BioSciences, Inc. (the "Company") 2006 Stock Incentive Plan on for the purchase of shares of Common Stock of the Company at a purchase price of $ per share.

I hereby exercise my option to purchase shares of Common Stock (the "Shares"), for which I have enclosed in the amount of . Please register my stock certificate as follows:

Name(s): _____

_____

Address: _____

Tax I.D. #: _____

I represent, warrant and covenant as follows:

1. I am purchasing the Shares for my own account for investment only, and not with a view to, or for sale in connection with, any distribution of the Shares in violation of the Securities Act of 1933 (the "Securities Act"), or any rule or regulation under the Securities Act.

2. I have had such opportunity as I have deemed adequate to obtain from representatives of the Company such information as is necessary to permit me to evaluate the merits and risks of my investment in the Company.

3. I have sufficient experience in business, financial and investment matters to be able to evaluate the risks involved in the purchase of the Shares and to make an informed investment decision with respect to such purchase.

4. I can afford a complete loss of the value of the Shares and am able to bear the economic risk of holding such Shares for an indefinite period.

5. I understand that (i) the Shares have not been registered under the Securities Act and are “restricted securities” within the meaning of Rule 144 under the Securities Act, (ii) the Shares cannot be sold, transferred or otherwise disposed of unless they are subsequently registered under the Securities Act or an exemption from registration is then available; (iii) in any event, the exemption from registration under Rule 144 will not be available for at least one year and even then will not be available unless a public market then exists for the Common Stock, adequate information concerning the Company is then available to the public, and other terms and conditions of Rule 144 are complied with; and (iv) there is now no registration statement on file with the Securities and Exchange Commission with respect to any stock of the Company and the Company has no obligation or current intention to register the Shares under the Securities Act.

Very truly yours,

_____

(Signature)

PRECISION BIOSCIENCES, INC.

Nonstatutory Stock Option Agreement
Granted Under 2006 Stock Incentive Plan

1. Grant of Option.

This agreement evidences the grant by Precision BioSciences, Inc., a Delaware corporation (the "Company"), on , 200[ ] (the "Grant Date") to , an [employee], [consultant], [director] of the Company (the "Participant"), of an option to purchase, in whole or in part, on the terms provided herein and in the Company's 2006 Stock Incentive Plan (the "Plan"), a total of [ ] shares (the "Shares") of common stock, $0.0001 par value per share, of the Company ("Common Stock") at $[ ] per Share.[1] Unless earlier terminated, this option shall expire at 5:00 p.m., Eastern time, on [ ] (the "Final Exercise Date").

It is intended that the option evidenced by this agreement shall not be an incentive stock option as defined in Section 422 of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "Code"). Except as otherwise indicated by the context, the term "Participant", as used in this option, shall be deemed to include any person who acquires the right to exercise this option validly under its terms.

2. Vesting Schedule.

This option will become exercisable ("vest") as to % of the original number of Shares on the [first] anniversary of the Grant Date and as to an additional % of the original number of Shares at the end of each successive [three-month] period following the first anniversary of the Grant Date until the [fourth] anniversary of the Grant Date.

The right of exercise shall be cumulative so that to the extent the option is not exercised in any period to the maximum extent permissible it shall continue to be exercisable, in whole or in part, with respect to all Shares for which it is vested until the earlier of the Final Exercise Date or the termination of this option under Section 3 hereof or the Plan.

3. Exercise of Option.

(a) Form of Exercise. Each election to exercise this option shall be in writing, signed by the Participant, and received by the Company at its principal office, accompanied by this agreement, and payment in full in the manner provided in the Plan. The Participant may purchase less than the number of shares covered hereby, provided that no partial exercise of this option may be for any fractional share or for fewer than ten whole shares.

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1 Under the Plan, there are no restrictions on the exercise price; however, if the exercise price is less than 100% of fair market value of the Common Stock as of the date of grant, the Company will incur a charge to earnings as the result of the grant of the option.

(b) Continuous Relationship with the Company Required. Except as otherwise provided in this Section 3, this option may not be exercised unless the Participant, at the time he or she exercises this option, is, and has been at all times since the Grant Date, an employee, officer or director, or consultant or advisor to, the Company or any other entity the employees, officers, directors, consultants, or advisors of which are eligible to receive option grants under the Plan (an "Eligible Participant").

(c) Termination of Relationship with the Company. If the Participant ceases to be an Eligible Participant for any reason, then, except as provided in paragraphs (d) and (e) below, the right to exercise this option shall terminate [three] months after such cessation (but in no event after the Final Exercise Date), provided that this option shall be exercisable only to the extent that the Participant was entitled to exercise this option on the date of such cessation. Notwithstanding the foregoing, if the Participant, prior to the Final Exercise Date, violates the non-competition or confidentiality provisions of any employment contract, confidentiality and nondisclosure agreement or other agreement between the Participant and the Company, the right to exercise this option shall terminate immediately upon written notice to the Participant from the Company describing such violation.

(d) Exercise Period Upon Death or Disability. If the Participant dies or becomes disabled (within the meaning of Section 22(e)(3) of the Code) prior to the Final Exercise Date while he or she is an Eligible Participant and the Company has not terminated such relationship for "cause" as specified in paragraph (e) below, this option shall be exercisable, within the period of one year following the date of death or disability of the Participant, by the Participant (or in the case of death by an authorized transferee), provided that this option shall be exercisable only to the extent that this option was exercisable by the Participant on the date of his or her death or disability, and further provided that this option shall not be exercisable after the Final Exercise Date.

(e) Termination for Cause. If, prior to the Final Exercise Date, the Participant's employment or other relationship with the Company is terminated by the Company for Cause (as defined below), the right to exercise this option shall terminate immediately upon the effective date of such termination of employment or other relationship. If, prior to the Final Exercise Date, the Participant is given notice by the Company of the termination of his or her employment or other relationship by the Company for Cause, and the effective date of such employment or other termination is subsequent to the date of the delivery of such notice, the right to exercise this option shall be suspended from the time of the delivery of such notice until the earlier of (i) such time as it is determined or otherwise agreed that the Participant's employment or other relationship shall not be terminated for Cause as provided in such notice or (ii) the effective date of such termination of employment or other relationship (in which case the right to exercise this option shall, pursuant to the preceding sentence, terminate immediately upon the effective date of such termination of employment or other relationship). If the Participant is party to an employment, consulting or severance agreement with the Company that contains a definition of "cause" for termination of employment or other relationship, "Cause" shall have the meaning ascribed to such term in such agreement. Otherwise, "Cause" shall mean willful misconduct by the Participant or willful failure by the Participant to perform his or her responsibilities to the Company (including, without limitation, breach by the Participant of any provision of any employment, consulting, advisory, nondisclosure, non-competition or other similar agreement

between the Participant and the Company), as determined by the Company, which determination shall be conclusive. The Participant shall be considered to have been discharged for "Cause" if the Company determines, within 30 days after the Participant's resignation, that discharge for cause was warranted.

4. Company Right of First Refusal.

(a) Notice of Proposed Transfer. If the Participant proposes to sell, assign, transfer, pledge, hypothecate or otherwise dispose of, by operation of law or otherwise (collectively, "transfer") any Shares acquired upon exercise of this option, then the Participant shall first give written notice of the proposed transfer (the "Transfer Notice") to the Company. The Transfer Notice shall name the proposed transferee and state the number of such Shares the Participant proposes to transfer (the "Offered Shares"), the price per share and all other material terms and conditions of the transfer.

(b) Company Right to Purchase. For 30 days following its receipt of such Transfer Notice, the Company shall have the option to purchase all or part of the Offered Shares at the price and upon the terms set forth in the Transfer Notice. In the event the Company elects to purchase all or part of the Offered Shares, it shall give written notice of such election to the Participant within such 30-day period. Within 10 days after his or her receipt of such notice, the Participant shall tender to the Company at its principal offices the certificate or certificates representing the Offered Shares to be purchased by the Company, duly endorsed in blank by the Participant or with duly endorsed stock powers attached thereto, all in a form suitable for transfer of the Offered Shares to the Company. Promptly following receipt of such certificate or certificates, the Company shall deliver or mail to the Participant a check in payment of the purchase price for such Offered Shares; provided that if the terms of payment set forth in the Transfer Notice were other than cash against delivery, the Company may pay for the Offered Shares on the same terms and conditions as were set forth in the Transfer Notice; and provided further that any delay in making such payment shall not invalidate the Company's exercise of its option to purchase the Offered Shares.

(c) Shares Not Purchased By Company. If the Company does not elect to acquire all of the Offered Shares, the Participant may, within the 30-day period following the expiration of the option granted to the Company under subsection (b) above, transfer the Offered Shares which the Company has not elected to acquire to the proposed transferee, provided that such transfer shall not be on terms and conditions more favorable to the transferee than those contained in the Transfer Notice. Notwithstanding any of the above, all Offered Shares transferred pursuant to this Section 4 shall remain subject to the right of first refusal set forth in this Section 4 and such transferee shall, as a condition to such transfer, deliver to the Company a written instrument confirming that such transferee shall be bound by all of the terms and conditions of this Section 4.

(d) Consequences of Non-Delivery. After the time at which the Offered Shares are required to be delivered to the Company for transfer to the Company pursuant to subsection (b) above, the Company shall not pay any dividend to the Participant on account of such Offered Shares or permit the Participant to exercise any of the privileges or rights of a stockholder

with respect to such Offered Shares, but shall, insofar as permitted by law, treat the Company as the owner of such Offered Shares.

(e) Exempt Transactions. The following transactions shall be exempt from the provisions of this Section 4:

(1) any transfer of Shares to or for the benefit of any spouse, child, parent, uncle, aunt, sibling, mother or father-in law, sister or brother-in-law or grandchild of the Participant, or any other relatives of the Participant approved by the Board of Directors (collectively, "Approved Relatives") or to a trust established solely for the benefit of the Participant and/or Approved Relatives;

(2) any transfer pursuant to an effective registration statement filed by the Company under the Securities Act of 1933, as amended (the "Securities Act"); and

(3) the sale of all or substantially all of the shares of capital stock of the Company (including pursuant to a merger or consolidation);

provided, however, that in the case of a transfer pursuant to clause (1) above, such Shares shall remain subject to the right of first refusal set forth in this Section 4 and such transferee shall, as a condition to such transfer, deliver to the Company a written instrument confirming that such transferee shall be bound by all of the terms and conditions of this Section 4.

(f) Assignment of Company Right. The Company may assign its rights to purchase Offered Shares in any particular transaction under this Section 4 to one or more persons or entities.

(g) Termination. The provisions of this Section 4 shall terminate upon the earlier of the following events:

(1) the closing of the sale of shares of Common Stock in an underwritten public offering pursuant to an effective registration statement filed by the Company under the Securities Act; or

(2) the sale of all or substantially all of the capital stock, assets or business of the Company, by merger, consolidation, sale of assets or otherwise (other than a merger or consolidation in which all or substantially all of the individuals and entities who were beneficial owners of the Common Stock immediately prior to such transaction beneficially own, directly or indirectly, more than 50% of the outstanding securities entitled to vote generally in the election of directors of the resulting, surviving or acquiring corporation in such transaction).

(h) No Obligation to Recognize Invalid Transfer. The Company shall not be required (1) to transfer on its books any of the Shares which shall have been sold or transferred in violation of any of the provisions set forth in this Section 4, or (2) to treat as owner of such Shares or to pay dividends to any transferee to whom any such Shares shall have been so sold or transferred.

(i) Legends. The certificate representing Shares shall bear a legend substantially in the following form (in addition to, or in combination with, any legend required by applicable federal and state securities laws and agreements relating to the transfer of the Company securities):

> "The shares represented by this certificate are subject to a right of first refusal in favor of the Company, as provided in a certain stock option agreement with the Company."

5. Agreement in Connection with Public Offering.

The Participant agrees, in connection with the initial underwritten public offering of the Company's securities pursuant to a registration statement under the Securities Act, (i) not to sell, make short sale of, loan, grant any options for the purchase of, or otherwise dispose of any shares of Common Stock held by the Participant (other than those shares included in the offering) without the prior written consent of the Company or the underwriters managing such initial underwritten public offering of the Company's securities for a period of 180 days from the effective date of such registration statement, and (ii) to execute any agreement reflecting clause (i) above as may be requested by the Company or the managing underwriters at the time of such offering.

6. Withholding.

No Shares will be issued pursuant to the exercise of this option unless and until the Participant pays to the Company, or makes provision satisfactory to the Company for payment of, any federal, state or local withholding taxes required by law to be withheld in respect of this option.

7. Nontransferability of Option.

This option may not be sold, assigned, transferred, pledged or otherwise encumbered by the Participant, either voluntarily or by operation of law, except by will or the laws of descent and distribution, and, during the lifetime of the Participant, this option shall be exercisable only by the Participant.

8. Provisions of the Plan.

This option is subject to the provisions of the Plan, a copy of which is furnished to the Participant with this option.

IN WITNESS WHEREOF, the Company has caused this option to be executed under its corporate seal by its duly authorized officer. This option shall take effect as a sealed instrument.

PRECISION BIOSCIENCES, INC.

Dated: _____

By: _____

Name: _____

Title: _____

NOTICE OF STOCK OPTION EXERCISE

Date:

Precision BioSciences, Inc.
2225 Gentry Drive
Durham, NC 27705

Attention: Treasurer

Dear Sir or Madam:

I am the holder of Nonstatutory Stock Option granted to me under the Precision BioSciences, Inc. (the "Company") 2006 Stock Incentive Plan on for the purchase of shares of Common Stock of the Company at a purchase price of $ per share.

I hereby exercise my option to purchase shares of Common Stock (the "Shares"), for which I have enclosed in the amount of . Please register my stock certificate as follows:

Name(s): _____

_____

Address: _____

Tax I.D. #: _____

I represent, warrant and covenant as follows:

1. I am purchasing the Shares for my own account for investment only, and not with a view to, or for sale in connection with, any distribution of the Shares in violation of the Securities Act of 1933 (the "Securities Act"), or any rule or regulation under the Securities Act.

2. I have had such opportunity as I have deemed adequate to obtain from representatives of the Company such information as is necessary to permit me to evaluate the merits and risks of my investment in the Company.

3. I have sufficient experience in business, financial and investment matters to be able to evaluate the risks involved in the purchase of the Shares and to make an informed investment decision with respect to such purchase.

4. I can afford a complete loss of the value of the Shares and am able to bear the economic risk of holding such Shares for an indefinite period.

5. I understand that (i) the Shares have not been registered under the Securities Act and are “restricted securities” within the meaning of Rule 144 under the Securities Act, (ii) the Shares cannot be sold, transferred or otherwise disposed of unless they are subsequently registered under the Securities Act or an exemption from registration is then available; (iii) in any event, the exemption from registration under Rule 144 will not be available for at least one year and even then will not be available unless a public market then exists for the Common Stock, adequate information concerning the Company is then available to the public, and other terms and conditions of Rule 144 are complied with; and (iv) there is now no registration statement on file with the Securities and Exchange Commission with respect to any stock of the Company and the Company has no obligation or current intention to register the Shares under the Securities Act.

Very truly yours,

_____

(Signature)

PRECISION BIOSCIENCES, INC.

Restricted Stock Agreement
Granted Under 2006 Stock Incentive Plan

AGREEMENT made this day of , 200 , between Precision BioSciences, Inc., a Delaware corporation (the "Company"), and (the "Participant").

For valuable consideration, receipt of which is acknowledged, the parties hereto agree as follows:

1. Purchase of Shares.

The Company shall issue and sell to the Participant, and the Participant shall purchase from the Company, subject to the terms and conditions set forth in this Agreement, shares (the "Shares") of common stock, $0.001 par value, of the Company ("Common Stock"), at a purchase price of $[ ] per share. The aggregate purchase price for the Shares shall be paid by the Participant by check payable to the order of the Company or such other method as may be acceptable to the Company. Upon receipt by the Company of payment for the Shares, the Company shall issue to the Participant one or more certificates in the name of the Participant for that number of Shares purchased by the Participant. The Participant agrees that the Shares shall be subject to the purchase options set forth in Sections 2 and 5 of this Agreement and the restrictions on transfer set forth in Section 4 of this Agreement.

2. Purchase Option.

(a) In the event that the Participant ceases to be employed by the Company for any reason or no reason, with or without cause, prior to , [ ] , the Company shall have the right and option (the "Purchase Option") to purchase from the Participant, for a sum of $[ ][1] per share (the "Option Price"), some or all of the Unvested Shares (as defined below).

"Unvested Shares" means the total number of Shares multiplied by the Applicable Percentage at the time the Purchase Option becomes exercisable by the Company. The "Applicable Percentage" shall be (i) 66% during the 12-month period ending , 200_, (ii) [75%] less [6.25%] for each one month of service completed by the Participant with the Company from and after , 200 , and (iii) zero on or after , 200 .

(b) In the event that the Participant's employment with the Company is terminated by reason of death or disability, the number of the Shares for which the Purchase Option becomes exercisable shall be fifty percent (50%) of the number of Unvested Shares for which the Purchase Option would otherwise become exercisable. For this purpose, "disability" shall mean the inability of the Participant, due to a medical reason, to carry out his duties as an employee of the Company for a period of six consecutive months.

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1 This is generally equal to the purchase price paid.

(c) If the Participant is employed by a parent or subsidiary of the Company, any references in this Agreement to employment with the Company or termination of employment by or with the Company shall instead be deemed to refer to such parent or subsidiary.

3. Exercise of Purchase Option and Closing.

(a) The Company may exercise the Purchase Option by delivering or mailing to the Participant (or his estate), within 90 days after the termination of the employment of the Participant with the Company, a written notice of exercise of the Purchase Option. Such notice shall specify the number of Shares to be purchased. If and to the extent the Purchase Option is not so exercised by the giving of such a notice within such 90-day period, the Purchase Option shall automatically expire and terminate effective upon the expiration of such 90-day period.

(b) Within 10 days after delivery to the Participant of the Company's notice of the exercise of the Purchase Option pursuant to subsection (a) above, the Participant (or his estate) shall, pursuant to the provisions of the Joint Escrow Instructions referred to in Section 7 below, tender to the Company at its principal offices the certificate or certificates representing the Shares which the Company has elected to purchase in accordance with the terms of this Agreement, duly endorsed in blank or with duly endorsed stock powers attached thereto, all in form suitable for the transfer of such Shares to the Company. Promptly following its receipt of such certificate or certificates, the Company shall pay to the Participant the aggregate Option Price for such Shares (provided that any delay in making such payment shall not invalidate the Company's exercise of the Purchase Option with respect to such Shares).

(c) After the time at which any Shares are required to be delivered to the Company for transfer to the Company pursuant to subsection (b) above, the Company shall not pay any dividend to the Participant on account of such Shares or permit the Participant to exercise any of the privileges or rights of a stockholder with respect to such Shares, but shall, in so far as permitted by law, treat the Company as the owner of such Shares.

(d) The Option Price may be payable, at the option of the Company, in cancellation of all or a portion of any outstanding indebtedness of the Participant to the Company or in cash (by check) or both.

(e) The Company shall not purchase any fraction of a Share upon exercise of the Purchase Option, and any fraction of a Share resulting from a computation made pursuant to Section 2 of this Agreement shall be rounded to the nearest whole Share (with any one-half Share being rounded upward).

(f) The Company may assign its Purchase Option to one or more persons or entities.

4. Restrictions on Transfer.

(a) The Participant shall not sell, assign, transfer, pledge, hypothecate or otherwise dispose of, by operation of law or otherwise (collectively "transfer") any Shares, or any interest therein, that are subject to the Purchase Option, except that the Participant may

transfer such Shares (i) to or for the benefit of any spouse, child, parent, uncle, aunt, sibling, grandchild and any other relatives approved by the Board of Directors (collectively, "Approved Relatives") or to a trust established solely for the benefit of the Participant and/or Approved Relatives, provided that such Shares shall remain subject to this Agreement (including without limitation the restrictions on transfer set forth in this Section 4, the Purchase Option and the right of first refusal set forth in Section 5) and such permitted transferee shall, as a condition to such transfer, deliver to the Company a written instrument confirming that such transferee shall be bound by all of the terms and conditions of this Agreement; or (ii) as part of the sale of all or substantially all of the shares of capital stock of the Company (including pursuant to a merger or consolidation), provided that, in accordance with Section 9(b) below, the securities or other property received by the Participant in connection with such transaction shall remain subject to this Agreement; or

(b) The Participant shall not transfer any Shares, or any interest therein, that are no longer subject to the Purchase Option, except in accordance with Section 5 below.

5. Right of First Refusal.

(a) If the Participant proposes to transfer any Shares that are no longer subject to the Purchase Option (either because they are no longer Unvested Shares or because the Purchase Option expired unexercised), then the Participant shall first give written notice of the proposed transfer (the "Transfer Notice") to the Company. The Transfer Notice shall name the proposed transferee and state the number of such Shares the Participant proposes to transfer (the "Offered Shares"), the price per share and all other material terms and conditions of the transfer.

(b) For 30 days following delivery to the Company of such Transfer Notice, the Company shall have the option to purchase all or part of the Offered Shares at the price and upon the terms set forth in the Transfer Notice. In the event the Company elects to purchase all or part of the Offered Shares, it shall give written notice of such election to the Participant within such 30-day period. Within 10 days after delivery to the Participant of such notice, the Participant shall tender to the Company at its principal offices the certificate or certificates representing the Offered Shares to be purchased by the Company, duly endorsed in blank by the Participant or with duly endorsed stock powers attached thereto, all in form suitable for transfer of the Offered Shares to the Company[2]. Promptly following receipt of such certificate or certificates, the Company shall deliver or mail to the Participant a check in payment of the purchase price for the Offered Shares; provided that if the terms of payment set forth in the Transfer Notice were other than cash against delivery, the Company may pay for the Offered Shares on the same terms and conditions as were set forth in the Transfer Notice; and provided further that any delay in making such payment shall not invalidate the Company's exercise of its option to purchase the Offered Shares.

(c) If the Company does not elect to acquire any of the Offered Shares, the Participant may, within the 30-day period following the expiration of the option granted to the

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2 There are California blue sky limitations on the repurchase of shares. This should be reviewed for any Participants who are California residents.

Company under subsection (b) above, transfer the Offered Shares which the Company has not elected to acquire to the proposed transferee, provided that such transfer shall not be on terms and conditions more favorable to the transferee than those contained in the Transfer Notice. Notwithstanding any of the above, all Offered Shares transferred pursuant to this Section 5 shall remain subject to this Agreement (including without limitation the restrictions on transfer set forth in Section 4 and the right of first refusal set forth in this Section 5) and such transferee shall, as a condition to such transfer, deliver to the Company a written instrument confirming that such transferee shall be bound by all of the terms and conditions of this Agreement.

(d) After the time at which the Offered Shares are required to be delivered to the Company for transfer to the Company pursuant to subsection (b) above, the Company shall not pay any dividend to the Participant on account of such Offered Shares or permit the Participant to exercise any of the privileges or rights of a stockholder with respect to such Shares, but shall, in so far as permitted by law, treat the Company as the owner of such Offered Shares.

(e) The following transactions shall be exempt from the provisions of this Section 5:

(1) a transfer of Shares to or for the benefit of any Approved Relatives, or to a trust established solely for the benefit of the Participant and/or Approved Relatives;

(2) any transfer pursuant to an effective registration statement filed by the Company under the Securities Act of 1933, as amended (the "Securities Act"); and

(3) the sale of all or substantially all of the shares of capital stock of the Company (including pursuant to a merger or consolidation);

provided, however, that in the case of a transfer pursuant to clause (1) above, such Shares shall remain subject to this Agreement (including without limitation the restrictions on transfer set forth in Section 4 and the right of first refusal set forth in this Section 5) and such transferee shall, as a condition to such transfer, deliver to the Company a written instrument confirming that such transferee shall be bound by all of the terms and conditions of this Agreement.

(f) The Company may assign its rights to purchase Offered Shares in any particular transaction under this Section 5 to one or more persons or entities.

(g) The provisions of this Section 5 shall terminate upon the earlier of the following events:

(1) the closing of the sale of shares of Common Stock in an underwritten public offering pursuant to an effective registration statement filed by the Company under the Securities Act; or

(2) the sale of all or substantially all of the capital stock, assets or business of the Company, by merger, consolidation, sale of assets or otherwise (other than a merger or consolidation in which all or substantially all of the individuals and entities who were

beneficial owners of the Common Stock immediately prior to such transaction beneficially own, directly or indirectly, more than 75% of the outstanding securities entitled to vote generally in the election of directors of the resulting, surviving or acquiring corporation in such transaction).

(h) The Company shall not be required (1) to transfer on its books any of the Shares which shall have been sold or transferred in violation of any of the provisions set forth in this Agreement, or (2) to treat as owner of such Shares or to pay dividends to any transferee to whom any such Shares shall have been so sold or transferred.

6. Agreement in Connection with Public Offering.

The Participant agrees, in connection with the initial underwritten public offering of the Company's securities pursuant to a registration statement under the Securities Act, (i) not to sell, make short sale of, loan, grant any options for the purchase of, or otherwise dispose of any shares of Common Stock held by the Participant (other than those shares included in the offering) without the prior written consent of the Company or the underwriters managing such initial underwritten public offering of the Company's securities for a period of 180 days from the effective date of such registration statement, and (ii) to execute any agreement reflecting clause (i) above as may be requested by the Company or the managing underwriters at the time of such offering.

7. Escrow.

The Participant shall, upon the execution of this Agreement, execute Joint Escrow Instructions in the form attached to this Agreement as Exhibit A. The Joint Escrow Instructions shall be delivered to the Secretary of the Company, as escrow agent thereunder. The Participant shall deliver to such escrow agent a stock assignment duly endorsed in blank, in the form attached to this Agreement as Exhibit B, and hereby instructs the Company to deliver to such escrow agent, on behalf of the Participant, the certificate(s) evidencing the Shares issued hereunder. Such materials shall be held by such escrow agent pursuant to the terms of such Joint Escrow Instructions.

8. Restrictive Legends.

All certificates representing Shares shall have affixed thereto legends in substantially the following form, in addition to any other legends that may be required under federal or state securities laws:

> "The shares of stock represented by this certificate are subject to restrictions on transfer and an option to purchase set forth in a certain Restricted Stock Agreement between the corporation and the registered owner of these shares (or his predecessor in interest), and such Agreement is available for inspection without charge at the office of the Secretary of the corporation."
>
> "The shares represented by this certificate have not been registered under the Securities Act of 1933, as amended, and may not be sold, transferred or otherwise disposed of in the absence of an effective

registration statement under such Act or an opinion of counsel satisfactory to the corporation to the effect that such registration is not required."

9. Provisions of the Plan.

(a) This Agreement is subject to the provisions of the Plan, a copy of which is furnished to the Participant with this Agreement.

(b) As provided in the Plan, upon the occurrence of a Reorganization Event (as defined in the Plan), the repurchase and other rights of the Company hereunder shall inure to the benefit of the Company's successor and shall apply to the cash, securities or other property which the Shares were converted into or exchanged for pursuant to such Reorganization Event in the same manner and to the same extent as they applied to the Shares under this Agreement. If, in connection with a Reorganization Event, a portion of the cash, securities and/or other property received upon the conversion or exchange of the Shares is to be placed into escrow to secure indemnification or similar obligations, the mix between the vested and unvested portion of such cash, securities and/or other property that is placed into escrow shall be the same as the mix between the vested and unvested portion of such cash, securities and/or other property that is not subject to escrow.

10. Investment Representations.

The Participant represents, warrants and covenants as follows:

(a) The Participant is purchasing the Shares for his own account for investment only, and not with a view to, or for sale in connection with, any distribution of the Shares in violation of the Securities Act, or any rule or regulation under the Securities Act.

(b) The Participant has had such opportunity as he has deemed adequate to obtain from representatives of the Company such information as is necessary to permit him to evaluate the merits and risks of his investment in the Company.

(c) The Participant has sufficient experience in business, financial and investment matters to be able to evaluate the risks involved in the purchase of the Shares and to make an informed investment decision with respect to such purchase.

(d) The Participant can afford a complete loss of the value of the Shares and is able to bear the economic risk of holding such Shares for an indefinite period.

(e) The Participant understands that (i) the Shares have not been registered under the Securities Act and are "restricted securities" within the meaning of Rule 144 under the Securities Act; (ii) the Shares cannot be sold, transferred or otherwise disposed of unless they are subsequently registered under the Securities Act or an exemption from registration is then available; (iii) in any event, the exemption from registration under Rule 144 will not be available for at least one year and even then will not be available unless a public market then exists for the Common Stock, adequate information concerning the Company is then available to the public, and other terms and conditions of Rule 144 are complied with; and (iv) there is now no

registration statement on file with the Securities and Exchange Commission with respect to any stock of the Company and the Company has no obligation or current intention to register the Shares under the Securities Act.

11. Withholding Taxes; Section 83(b) Election.

(a) The Participant acknowledges and agrees that the Company has the right to deduct from payments of any kind otherwise due to the Participant any federal, state or local taxes of any kind required by law to be withheld with respect to the purchase of the Shares by the Participant or the lapse of the Purchase Option.

(b) The Participant has reviewed with the Participant's own tax advisors the federal, state, local and foreign tax consequences of this investment and the transactions contemplated by this Agreement. The Participant is relying solely on such advisors and not on any statements or representations of the Company or any of its agents. The Participant understands that the Participant (and not the Company) shall be responsible for the Participant's own tax liability that may arise as a result of this investment or the transactions contemplated by this Agreement. The Participant understands that it may be beneficial in many circumstances to elect to be taxed at the time the Shares are purchased rather than when and as the Company's Purchase Option expires by filing an election under Section 83(b) of the Internal Revenue Code of 1986 with the IRS within 30 days from the date of purchase.

THE PARTICIPANT ACKNOWLEDGES THAT IT IS SOLELY THE PARTICIPANT'S RESPONSIBILITY AND NOT THE COMPANY'S TO FILE TIMELY THE ELECTION UNDER SECTION 83(B), EVEN IF THE PARTICIPANT REQUESTS THE COMPANY OR ITS REPRESENTATIVES TO MAKE THIS FILING ON THE PARTICIPANT'S BEHALF.

12. Miscellaneous.

(a) No Rights To Employment. Nothing contained in this Agreement shall be construed as giving the Participant any right to be retained, in any position, as an employee of the Company. The Participant acknowledges and agrees that the vesting of the Shares pursuant to Section 2 hereof is earned only by continuing service as an employee at the will of the Company (not through the act of being hired or purchasing shares hereunder). The Participant further acknowledges and agrees that the transactions contemplated hereunder and the vesting schedule set forth herein do not constitute an express or implied promise of continued engagement as an employee for the vesting period, for any period, or at all.

(b) Severability. The invalidity or unenforceability of any provision of this Agreement shall not affect the validity or enforceability of any other provision of this Agreement, and each other provision of this Agreement shall be severable and enforceable to the extent permitted by law.

(c) Waiver. Any provision for the benefit of the Company contained in this Agreement may be waived, either generally or in any particular instance, by the Board of Directors of the Company.

(d) Binding Effect. This Agreement shall be binding upon and inure to the benefit of the Company and the Participant and their respective heirs, executors, administrators, legal representatives, successors and assigns, subject to the restrictions on transfer set forth in Sections 4 and 5 of this Agreement.

(e) Notice. All notices required or permitted hereunder shall be in writing and deemed effectively given upon personal delivery or five days after deposit in the United States Post Office, by registered or certified mail, postage prepaid, addressed to the other party hereto at the address shown beneath his or its respective signature to this Agreement, or at such other address or addresses as either party shall designate to the other in accordance with this Section 12(e).

(f) Pronouns. Whenever the context may require, any pronouns used in this Agreement shall include the corresponding masculine, feminine or neuter forms, and the singular form of nouns and pronouns shall include the plural, and vice versa.

(g) Entire Agreement. This Agreement constitutes the entire agreement between the parties, and supersedes all prior agreements and understandings, relating to the subject matter of this Agreement.

(h) Amendment. This Agreement may be amended or modified only by a written instrument executed by both the Company and the Participant.

(i) Governing Law. This Agreement shall be construed, interpreted and enforced in accordance with the internal laws of the State of Delaware without regard to any applicable conflicts of laws.

(j) Participant's Acknowledgements. The Participant acknowledges that he or she: (i) has read this Agreement; (ii) has been represented in the preparation, negotiation, and execution of this Agreement by legal counsel of the Participant's own choice or has voluntarily declined to seek such counsel; (iii) understands the terms and consequences of this Agreement; (iv) is fully aware of the legal and binding effect of this Agreement; and (v) understands that the law firm of WilmerHale is acting as counsel to the Company in connection with the transactions contemplated by the Agreement, and is not acting as counsel for the Participant.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

PRECISION BIOSCIENCES, INC.

Dated: _____

By: _____

Title: _____

Address: _____

_____

_____

_____

[Name of Participant]

Address: _____

_____

Exhibit A

Precision BioSciences, Inc.

Joint Escrow Instructions

_____, [ ]

Secretary
Precision BioSciences, Inc.
2225 Gentry Drive
Durham, NC 27705

Dear Sir:

As Escrow Agent for Precision BioSciences, Inc., a Delaware corporation, and its successors in interest under the Restricted Stock Agreement (the "Agreement") of even date herewith, to which a copy of these Joint Escrow Instructions is attached (the "Company"), and the undersigned person ("Holder"), you are hereby authorized and directed to hold the documents delivered to you pursuant to the terms of the Agreement in accordance with the following instructions:

1. Appointment. Holder irrevocably authorizes the Company to deposit with you any certificates evidencing Shares (as defined in the Agreement) to be held by you hereunder and any additions and substitutions to said Shares. For purposes of these Joint Escrow Instructions, "Shares" shall be deemed to include any additional or substitute property. Holder does hereby irrevocably constitute and appoint you as his attorney-in-fact and agent for the term of this escrow to execute with respect to such Shares all documents necessary or appropriate to make such Shares negotiable and to complete any transaction herein contemplated. Subject to the provisions of this Section 1 and the terms of the Agreement, Holder shall exercise all rights and privileges of a stockholder of the Company while the Shares are held by you.

2. Closing of Purchase.

(a) Upon any purchase by the Company of the Shares pursuant to the Agreement, the Company shall give to Holder and you a written notice specifying the number of Shares to be purchased, the purchase price for the Shares, as determined pursuant to the Agreement, and the time for a closing hereunder (the "Closing") at the principal office of the Company. Holder and the Company hereby irrevocably authorize and direct you to close the transaction contemplated by such notice in accordance with the terms of said notice.

(b) At the Closing, you are directed (i) to date the stock assignment form or forms necessary for the transfer of the Shares, (ii) to fill in on such form or forms the number of Shares being transferred, and (iii) to deliver same, together with the certificate or certificates

evidencing the Shares to be transferred, to the Company against the simultaneous delivery to you of the purchase price for the Shares being purchased pursuant to the Agreement.

3. Withdrawal. The Holder shall have the right to withdraw from this escrow any Shares as to which the Purchase Option and Right of First Refusal (each as defined in the Agreement) have terminated or expired.

4. Duties of Escrow Agent.

(a) Your duties hereunder may be altered, amended, modified or revoked only by a writing signed by all of the parties hereto.

(b) You shall be obligated only for the performance of such duties as are specifically set forth herein and may rely and shall be protected in relying or refraining from acting on any instrument reasonably believed by you to be genuine and to have been signed or presented by the proper party or parties. You shall not be personally liable for any act you may do or omit to do hereunder as Escrow Agent or as attorney-in-fact of Holder while acting in good faith and in the exercise of your own good judgment, and any act done or omitted by you pursuant to the advice of your own attorneys shall be conclusive evidence of such good faith.

(c) You are hereby expressly authorized to disregard any and all warnings given by any of the parties hereto or by any other person or entity, excepting only orders or process of courts of law, and are hereby expressly authorized to comply with and obey orders, judgments or decrees of any court. If you are uncertain of any actions to be taken or instructions to be followed, you may refuse to act in the absence of an order, judgment or decrees of a court. In case you obey or comply with any such order, judgment or decree of any court, you shall not be liable to any of the parties hereto or to any other person or entity, by reason of such compliance, notwithstanding any such order, judgment or decree being subsequently reversed, modified, annulled, set aside, vacated or found to have been entered without jurisdiction.

(d) You shall not be liable in any respect on account of the identity, authority or rights of the parties executing or delivering or purporting to execute or deliver the Agreement or any documents or papers deposited or called for hereunder.

(e) You shall be entitled to employ such legal counsel and other experts as you may deem necessary properly to advise you in connection with your obligations hereunder and may rely upon the advice of such counsel.

(f) Your rights and responsibilities as Escrow Agent hereunder shall terminate if (i) you cease to be Secretary of the Company or (ii) you resign by written notice to each party. In the event of a termination under clause (i), your successor as Secretary shall become Escrow Agent hereunder; in the event of a termination under clause (ii), the Company shall appoint a successor Escrow Agent hereunder.

(g) If you reasonably require other or further instruments in connection with these Joint Escrow Instructions or obligations in respect hereto, the necessary parties hereto shall join in furnishing such instruments.

(h) It is understood and agreed that if you believe a dispute has arisen with respect to the delivery and/or ownership or right of possession of the securities held by you hereunder, you are authorized and directed to retain in your possession without liability to anyone all or any part of said securities until such dispute shall have been settled either by mutual written agreement of the parties concerned or by a final order, decree or judgment of a court of competent jurisdiction after the time for appeal has expired and no appeal has been perfected, but you shall be under no duty whatsoever to institute or defend any such proceedings.

(i) These Joint Escrow Instructions set forth your sole duties with respect to any and all matters pertinent hereto and no implied duties or obligations shall be read into these Joint Escrow Instructions against you.

(j) The Company shall indemnify you and hold you harmless against any and all damages, losses, liabilities, costs, and expenses, including attorneys' fees and disbursements, (including without limitation the fees of counsel retained pursuant to Section 4(e) above), for anything done or omitted to be done by you as Escrow Agent in connection with this Agreement or the performance of your duties hereunder, except such as shall result from your gross negligence or willful misconduct.

5. Notice. Any notice required or permitted hereunder shall be given in writing and shall be deemed effectively given upon personal delivery or upon deposit in the United States Post Office, by registered or certified mail with postage and fees prepaid, addressed to each of the other parties thereunto entitled at the following addresses, or at such other addresses as a party may designate by ten days' advance written notice to each of the other parties hereto.

COMPANY:	Notices to the Company shall be sent to the address set forth in the salutation hereto, Attn: President
HOLDER:	Notices to Holder shall be sent to the address set forth below Holder's signature below.
ESCROW AGENT:	Notices to the Escrow Agent shall be sent to the address set forth in the salutation hereto.

6. Miscellaneous.

(a) By signing these Joint Escrow Instructions, you become a party hereto only for the purpose of said Joint Escrow Instructions, and you do not become a party to the Agreement.

(b) This instrument shall be binding upon and inure to the benefit of the parties hereto and their respective successors and permitted assigns.

Very truly yours,

PRECISION BIOSCIENCES, INC.

By: _____
Tide: _____

HOLDER:

_____
(Signature)

_____
Print Name

Address:

_____

_____

Date Signed: _____

ESCROW AGENT:

_____

Exhibit B

(STOCK ASSIGNMENT SEPARATE FROM CERTIFICATE)

FOR VALUE RECEIVED, I hereby sell, assign and transfer unto ( ) shares of Common Stock, $[0.01] par value per share, of Precision BioSciences, Inc. (the "Corporation") standing in my name on the books of the Corporation represented by Certificate(s) Number herewith, and do hereby irrevocably constitute and appoint attorney to transfer the said stock on the books of the Corporation with full power of substitution in the premises.

Dated: _____

IN PRESENCE OF _____

_____

NOTICE: The signature(s) to this assignment must correspond with the name as written upon the face of the certificate, in every particular, without alteration, enlargement, or any change whatever and must be guaranteed by a commercial bank, trust company or member firm of the Boston, New York or Midwest Stock Exchange.

PRECISION BIOSCIENCES, INC.

2015 STOCK INCENTIVE PLAN

1. Purpose

The purpose of this 2015 Stock Incentive Plan (the "**Plan**") of Precision BioSciences, Inc., a Delaware corporation (the "**Company**"), is to advance the interests of the Company's stockholders by enhancing the Company's ability to attract, retain and motivate persons who are expected to make important contributions to the Company and by providing such persons with equity ownership opportunities and performance-based incentives that are intended to align their interests with those of the Company's stockholders. Except where the context otherwise requires, the term "**Company**" includes the Company's present or future parent or subsidiary corporations as defined in Sections 424(e) or (f) of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "**Code**") and other business ventures (including, without limitation, any joint venture or limited liability company) in which the Company has a controlling interest, as determined by the Company's Board of Directors (the "**Board**").

2. Eligibility

All of the Company's employees, officers, directors, consultants, advisors, advisory board members, or other service providers (each a "**Service Provider**") are eligible to receive options, restricted stock, restricted stock units and other stock-based awards (each, an "**Award**") under the Plan. Each person who receives an Award under the Plan is deemed a "**Participant**."

3. Administration and Delegation

(a) Administration by Board of Directors. The Plan shall be administered by the Board. The Board shall have authority to grant Awards and to adopt, amend and repeal such administrative rules, guidelines and practices relating to the Plan as it shall deem advisable. The Board may correct any defect, supply any omission or reconcile any inconsistency in the Plan or any Award in the manner and to the extent it shall deem expedient to carry the Plan into effect and it shall be the sole and final judge of such expediency. All decisions by the Board shall be made in the Board's sole discretion and shall be final and binding on all persons having or claiming any interest in the Plan or in any Award. No director or person acting pursuant to the authority delegated by the Board shall be liable for any action or determination relating to or under the Plan made in good faith.

(b) Appointment of Committees. To the extent permitted by applicable law, the Board may delegate any or all of its powers under the Plan to one or more committees or subcommittees of the Board (a "**Committee**"). All references in the Plan to the "**Board**" shall mean the Board or a Committee of the Board to the extent that the Board's powers or authority under the Plan have been delegated to such Committee.

4. Stock Available for Awards.

(a) Subject to adjustment under Section 8, Awards may be made under the Plan for up to Eleven Million Two Hundred Fifty Thousand (11,250,000) shares of the Company's common stock, $0.000005 par value per share (the "**Common Stock**"). All shares reserved under the Plan may be granted as Incentive Stock Options or any other form of award permitted under the Plan in the Board's

discretion. If any Award expires or is terminated, surrendered or canceled without having been fully exercised or is forfeited in whole or in part (including as the result of shares of Common Stock subject to such Award being repurchased by the Company at the original issuance price pursuant to a contractual repurchase right) or results in any Common Stock not being issued, the unused Common Stock covered by such Award shall again be available for the grant of Awards under the Plan. Further, shares of Common Stock tendered to the Company by a Participant to exercise an Award shall be added to the number of shares of Common Stock available for the grant of Awards under the Plan. However, in the case of Incentive Stock Options (as hereinafter defined), the foregoing provisions shall be subject to any applicable limitations under the Code. Shares issued under the Plan may consist in whole or in part of authorized but unissued shares or treasury shares. At no time while there is any Option (as defined below) outstanding and held by a Participant who was a resident of the State of California on the date of grant of such Option, shall the total number of shares of Common Stock issuable upon exercise of all outstanding options and the total number of shares provided for under any stock bonus or similar plan or agreement of the Company exceed the applicable percentage as calculated in accordance with the conditions and exclusions of Section 260.140.45 of the California Code of Regulations, as amended or any successor regulations (the "**California Regulations**"), based on the shares of the Company which are outstanding at the time the calculation is made unless the Plan complies with all conditions of Rule 701 of the Securities Act of 1933, as amended.

(b) Substitute Awards. In connection with a merger or consolidation of an entity with the Company or the acquisition by the Company of property or stock of an entity, the Board may grant Awards in substitution for any options or other stock or stock-based awards granted by such entity or an affiliate thereof. Substitute Awards may be granted on such terms as the Board deems appropriate in the circumstances, notwithstanding any limitations on Awards contained in the Plan. Substitute Awards shall not count against the overall share limit set forth in Section 4(a), except as may be required by reason of Section 422 and related provisions of the Code.

5. Stock Options

(a) General. The Board may grant options to purchase Common Stock (each, an "**Option**") and determine the number of shares of Common Stock to be covered by each Option, the exercise price of each Option and the conditions and limitations applicable to the exercise of each Option, including conditions relating to applicable federal or state securities laws, as it considers necessary or advisable. An Option, or portion of an Option, which is not intended to be or fails to qualify as an Incentive Stock Option (as hereinafter defined) for any reason whatsoever shall be designated a "**Nonstatutory Stock Option.**"

(b) Incentive Stock Options. An Option that the Board intends to be an "incentive stock option" as defined in Section 422 of the Code (an "**Incentive Stock Option**") shall only be granted to employees of the Company and any other entities the employees of which are eligible to receive Incentive Stock Options under the Code, and shall be subject to and shall be construed consistently with the requirements of Section 422 of the Code. A Participant who owns more than 10% of the total combined voting power of all classes of outstanding stock of the Company shall not be eligible for the grant of an Incentive Stock Option unless (i) the exercise price is at least 110% of the Fair Market Value (as defined below) on the date the Option is granted and (ii) such Incentive Stock Option by its terms is not exercisable after the expiration of five years from the date the Option is granted. The Company shall have no liability to a Participant, or any other party, if an Option (or any part thereof) that is intended to be an Incentive Stock Option is not an Incentive Stock Option or for any action taken by the Board pursuant to Section 9(f), including without limitation the conversion of an Incentive Stock Option to a Nonstatutory Stock Option.

(c) Exercise Price. The Board shall establish the exercise price of each Option and specify such exercise price in the applicable option agreement. The exercise price shall be not less than 100% of the Fair Market Value on the date the Option is granted; provided that if the Board approves the grant of an Option with an exercise price to be determined on a future date, the exercise price shall be not less than 100% of the Fair Market Value on such future date. The term "**Fair Market Value**" shall mean, as of a given date: (i) if the Common Stock is listed on a national securities exchange, the last sale price of the Common Stock in the principal trading market for the Common Stock on such date; (ii) if the Common Stock is not listed on a national securities exchange, but is traded in the over-the counter market, the closing bid price for the Common Stock on such date, as reported by the OTC Bulletin Board or the National Quotation Bureau, Incorporated or similar publisher of such quotations; or (iii) if the Common Stock is not listed on a national securities exchange or traded in the over-the-counter market, such price as shall be determined by (or in a manner approved by) the Board in good faith and in compliance with applicable provisions of the Code and the regulations issued thereunder.

(d) Duration of Options. Each Option shall be exercisable at such times and subject to such terms and conditions as the Board may specify in the applicable option agreement.

(e) Exercise of Option. Options may be exercised by delivery to the Company of a written notice of exercise signed by the proper person or by any other form of notice (including electronic notice) approved by the Board together with payment in full as specified in Section 5(f) for the number of shares of Common Stock for which the Option is exercised. Shares of Common Stock subject to the Option will be delivered by the Company following exercise either as soon as practicable or, subject to such conditions as the Board shall specify, on a deferred basis (with the Company's obligation to be evidenced by an instrument providing for future delivery of the deferred shares at the time or times specified by the Board).

(f) Payment Upon Exercise. Common Stock purchased upon the exercise of an Option granted under the Plan shall be paid for as follows:

(1) in cash or by check, payable to the order of the Company;

(2) when the Common Stock is registered under the Securities Exchange Act of 1934, as amended (the "**Exchange Act**") and to the extent expressly provided for in the applicable option agreement or approved by the Board, in its sole discretion, by (i) delivery of an irrevocable and unconditional undertaking by a creditworthy broker to deliver promptly to the Company sufficient funds to pay the exercise price and any required tax withholding or (ii) delivery by the Participant to the Company of a copy of irrevocable and unconditional instructions to a creditworthy broker to deliver promptly to the Company cash or a check sufficient to pay the exercise price and any required tax withholding;

(3) when the Common Stock is registered under the Exchange Act and to the extent expressly provided for in the applicable option agreement or approved by the Board, in its sole discretion, by delivery (either by actual delivery or attestation) of shares of Common Stock owned by the Participant valued at their Fair Market Value, provided (i) such method of payment is then permitted under applicable law, (ii) such Common Stock, if acquired directly from the Company, was owned by the Participant for such minimum period of time, if any, as may be established by the Board in its discretion and (iii) such Common Stock is not subject to any repurchase, forfeiture, unfulfilled vesting or other similar requirements;

(4) to the extent permitted by applicable law and provided for in the applicable option agreement or approved by the Board, in its sole discretion, by (i) delivery of a promissory note of the Participant to the Company on terms determined by the Board, or (ii) payment of such other lawful consideration as the Board may determine; or

(5) by any combination of the above permitted forms of payment.

6. Restricted Stock; Restricted Stock Units

(a) General. The Board may grant Awards entitling recipients to acquire shares of Common Stock ("**Restricted Stock**"), subject to the right of the Company to repurchase all or part of such shares at their issue price or other stated or formula price (or to require forfeiture of such shares if issued at no cost) from the recipient in the event that conditions specified by the Board in the applicable Award are not satisfied prior to the end of the applicable restriction period or periods established by the Board for such Award. Instead of granting Awards for Restricted Stock, the Board may grant Awards entitling the recipient to receive shares of Common Stock to be delivered at the time such shares of Common Stock vest ("**Restricted Stock Units**") (Restricted Stock and Restricted Stock Units are each referred to herein as a "**Restricted Stock Award**").

(b) Terms and Conditions. The Board shall determine the terms and conditions of a Restricted Stock Award, including the conditions for repurchase (or forfeiture) and the issue price, if any.

(c) Additional Provisions Relating to Restricted Stock.

(1) Dividends. Participants holding shares of Restricted Stock will be entitled to all ordinary cash dividends paid with respect to such shares, unless otherwise provided by the Board. If any such dividends or distributions are paid in shares, or consist of a dividend or distribution to holders of Common Stock other than an ordinary cash dividend, the shares, cash or other property will be subject to the same restrictions on transferability and forfeitability as the shares of Restricted Stock with respect to which they were paid. Each dividend payment will be made no later than the end of the calendar year in which the dividends are paid to stockholders of that class of stock or, if later, the 15th day of the third month following the date the dividends are paid to stockholders of that class of stock.

(2) Stock Certificates. The Company may require that any stock certificates issued in respect of a Restricted Stock Award shall be registered in the name of the Participant and be deposited by the Participant, together with a stock power endorsed in blank, with the Company (or its designee). After the expiration of the applicable restriction periods, upon request of a Participant or as otherwise determined by the Company, the Company (or such designee) shall deliver the certificates no longer subject to such restrictions to the Participant or if the Participant has died, to the beneficiary designated, in a manner determined by the Board, by a Participant to receive amounts due or exercise rights of the Participant in the event of the Participant's death (the "**Designated Beneficiary**"). In the absence of an effective designation by a Participant, "Designated Beneficiary" shall mean the Participant's then living spouse, or, if none, the Participant's estate.

7. Other Stock-Based Awards

Other Awards of shares of Common Stock, and other Awards that are valued in whole or in part by reference to, or are otherwise based on, shares of Common Stock, may be granted hereunder to Participants ("**Other Stock-Based Awards**"), including without limitation stock appreciation rights and Awards entitling recipients to receive shares of Common Stock to be delivered in the future. Such Other

Stock-Based Awards shall also be available as a form of payment in the settlement of other Awards granted under the Plan or as payment in lieu of compensation to which a Participant is otherwise entitled. Other Stock-Based Awards may be paid in shares of Common Stock or cash, as the Board shall determine. Subject to the provisions of the Plan, the Board shall determine the conditions of each Other Stock-Based Award, including any purchase price applicable thereto.

8. Adjustments for Changes in Common Stock and Certain Other Events

(a) Changes in Capitalization. In the event of any stock split, reverse stock split, stock dividend, recapitalization, combination of shares, reclassification of shares, spin-off or other similar change in capitalization or event, or any dividend or distribution to holders of Common Stock other than an ordinary cash dividend, (i) the number and class of securities available under this Plan, (ii) the number and class of securities and exercise price per share of each outstanding Option, (iii) the number of shares subject to and the repurchase price per share subject to each outstanding Restricted Stock Award, and (iv) the terms of each other outstanding Award shall be equitably adjusted by the Company (or substituted Awards may be made, if applicable) in the manner determined by the Board. Without limiting the generality of the foregoing, in the event the Company effects a split of the Common Stock by means of a stock dividend and the exercise price of and the number of shares subject to an outstanding Option are adjusted as of the date of the distribution of the dividend (rather than as of the record date for such dividend), then an optionee who exercises an Option between the record date and the distribution date for such stock dividend shall be entitled to receive, on the distribution date, the stock dividend with respect to the shares of Common Stock acquired upon such Option exercise, notwithstanding the fact that such shares were not outstanding as of the close of business on the record date for such stock dividend.

(b) Change in Control

(1) Definition. Unless otherwise specifically provided in an Award agreement, a "**Change in Control**" shall be deemed to have occurred upon the first to occur of:

(i) a transaction or series of related transactions in which a person, or a group of related persons, acquires from stockholders of the Company shares representing more than fifty percent (50%) of the outstanding voting power of the Company;

(ii) the closing of the sale, transfer, lease, exclusive license or other disposition, in one transaction or a series of related transactions, of all or substantially all of the Company's assets;

(iii) the consummation of the merger or consolidation of the Company with or into another entity (except a merger or consolidation in which the holders of capital stock of the Company immediately prior to such merger or consolidation continue to hold a majority of the voting power of the capital stock of the Company or the surviving or acquiring entity); or

(iv) the closing of the transfer (whether by merger, consolidation or otherwise), in one transaction or a series of related transactions in which the Company is a constituent party, to a person or group of affiliated persons (other than an underwriter of the Company's securities), of the Company's securities if, after such closing, such person or group of affiliated persons would hold a majority of the outstanding voting stock of the Company (or the surviving or acquiring entity).

(2) Consequences of a Change in Control on Awards Other than Restricted Stock Awards. Unless otherwise specifically provided in an Award Agreement, the Board may take any one or more of the following actions as to all (or any portion of) outstanding Awards other than Restricted Stock Awards on such terms as the Board determines in connection with a Change in Control: (i) provide that Awards shall be assumed, or substantially equivalent Awards shall be substituted, by the acquiring or succeeding corporation (or an affiliate thereof) in compliance with the applicable provisions of the Code, including Code Sections 409A, 422 and 424; (ii) upon written notice to a Participant, provide that the Participant's unexercised Options or other unexercised Awards will terminate immediately prior to the consummation of such Change in Control unless exercised by the Participant within a specified period following the date of such notice; (iii) provide that outstanding Awards shall become exercisable, realizable or deliverable, or restrictions applicable to an Award shall lapse, in whole or in part prior to or upon such Change in Control; (iv) in the event of a Change in Control under the terms of which holders of Common Stock will receive upon consummation thereof a cash payment for each share surrendered in the Change in Control (the "**Acquisition Price**"), make or provide for a cash payment to a Participant equal to the excess, if any, of (A) the Acquisition Price times the number of shares of Common Stock subject to the Participant's Options or other Awards (to the extent the exercise price does not exceed the Acquisition Price) less (B) the aggregate exercise price of all such outstanding Options or other Awards and any applicable tax withholdings, in exchange for the termination of such Options or other Awards; (v) provide that, in connection with a liquidation or dissolution of the Company, Awards shall convert into the right to receive liquidation proceeds (if applicable, net of the exercise price thereof); and (vi) any combination of the foregoing. In taking any of the actions permitted under this Section 8(b), the Board shall not be obligated by the Plan to treat all Awards, or all Awards of the same type, identically.

For purposes of clause (i) above, an Option shall be considered assumed if, following consummation of the Change in Control, the Option confers the right to purchase, for each share of Common Stock subject to the Option immediately prior to the consummation of the Change in Control, the consideration (whether cash, securities or other property) received as a result of the Change in Control by holders of Common Stock for each share of Common Stock held immediately prior to the consummation of the Change in Control (and if holders were offered a choice of consideration, the type of consideration chosen by the holders of a majority of the outstanding shares of Common Stock); provided, however, that if the consideration received as a result of the Change in Control is not solely common stock of the acquiring or succeeding corporation (or an affiliate thereof), the Company may, with the consent of the acquiring or succeeding corporation, provide for the consideration to be received upon the exercise of Options to consist solely of common stock of the acquiring or succeeding corporation (or an affiliate thereof) equivalent in value (as determined by the Board) to the per share consideration received by holders of outstanding shares of Common Stock as a result of the Change in Control.

(3) Consequences of a Change in Control on Restricted Stock Awards. Upon the occurrence of a Change in Control other than a liquidation or dissolution of the Company, the repurchase and other rights of the Company under each outstanding Restricted Stock Award shall inure to the benefit of the Company's successor and shall, unless the Board determines otherwise, apply to the cash, securities or other property which the Common Stock was converted into or exchanged for pursuant to such Change in Control in the same manner and to the same extent as they applied to the Common Stock subject to such Restricted Stock Award. Upon the occurrence of a Change in Control involving the liquidation or dissolution of the Company, except to the extent specifically provided to the contrary in the instrument evidencing any Restricted Stock Award or any other agreement between a Participant and the Company, all restrictions and conditions on all Restricted Stock Awards then outstanding shall automatically be deemed terminated or satisfied.

9. General Provisions Applicable to Awards

(a) Transferability of Awards. Except as the Board may otherwise expressly determine or provide in an Award, Awards shall not be sold, assigned, transferred, pledged or otherwise encumbered by the person to whom they are granted, either voluntarily or by operation of law, except by will or the laws of descent and distribution or, other than in the case of an Incentive Stock Option, pursuant to a qualified domestic relations order, and, during the life of the Participant, shall be exercisable only by the Participant. For the avoidance of doubt, the Board may not expressly provide for the transferability of an Incentive Stock Option in an Incentive Stock Option Agreement or otherwise except as may be permitted under Section 422 of the Code. References to a Participant, to the extent relevant in the context, shall include references to authorized transferees.

(b) Documentation. Unless otherwise expressly determined by the Board, each Nonstatutory Stock Option shall be evidenced by a Notice of Nonstatutory Stock Option and Nonstatutory Stock Option Agreement substantially in the form attached as **Exhibit A**, each Incentive Stock Option shall be evidenced by a Notice of Incentive Stock Option and Incentive Stock Option Agreement substantially in the form attached as **Exhibit B**, and each Restricted Stock Award shall be evidenced by a Summary of Restricted Stock Purchase and Restricted Stock Purchase Agreement or similar agreement in substantially the form approved by the Board for such purposes from time to time. Each Award may contain terms and conditions in addition to those set forth in the Plan.

(c) Board Discretion. Except as otherwise provided by the Plan, each Award may be made alone or in addition or in relation to any other Award. The terms of each Award need not be identical, and the Board need not treat Participants uniformly.

(d) Termination of Status. The Board shall determine the effect on an Award of the disability, death, termination of employment, authorized leave of absence or other change in the employment or other status of a Participant and the extent to which, and the period during which, the Participant, or the Participant's legal representative, conservator, guardian or Designated Beneficiary, may exercise rights under the Award.

(e) Withholding. The Participant must satisfy all applicable federal, state, and local or other income and employment tax withholding obligations before the Company will deliver stock certificates or otherwise recognize ownership of Common Stock under an Award. The Company may decide to satisfy the withholding obligations through additional withholding on salary or wages. If the Company elects not to or cannot withhold from other compensation, the Participant must pay the Company the full amount, if any, required for withholding or have a broker tender to the Company cash equal to the withholding obligations. Payment of withholding obligations is due before the Company will issue any shares on exercise or release from forfeiture of an Award or, if the Company so requires, at the same time as is payment of the exercise price unless the Company determines otherwise. If provided for in an Award or approved by the Board in its sole discretion, a Participant may satisfy such tax obligations in whole or in part by delivery of shares of Common Stock, including shares retained from the Award creating the tax obligation, valued at their Fair Market Value; provided, however, except as otherwise provided by the Board, that the total tax withholding where stock is being used to satisfy such tax obligations cannot exceed the Company's minimum statutory withholding obligations (based on minimum statutory withholding rates for federal and state tax purposes, including payroll taxes, that are applicable to such supplemental taxable income). Shares surrendered to satisfy tax withholding requirements cannot be subject to any repurchase, forfeiture, unfulfilled vesting or other similar requirements.

(f) Amendment of Award.

(1) The Board may amend, modify or terminate any outstanding Award, including but not limited to, substituting therefor another Award of the same or a different type, changing the date of exercise or realization, and converting an Incentive Stock Option to a Nonstatutory Stock Option, provided that the Participant's consent to such action shall be required unless the Board determines that the action, taking into account any related action, would not materially and adversely affect the Participant.

(2) The Board may, without stockholder approval, amend any outstanding Award granted under the Plan to provide an exercise price per share that is lower than the then-current exercise price per share of such outstanding Award provided that such amended exercise price is at least equal to the then-current Fair Market Value. The Board may also, without stockholder approval, cancel any outstanding award (whether or not granted under the Plan) and grant in substitution new Awards under the Plan covering the same or a different number of shares of Common Stock and having an exercise price per share lower than the then-current exercise price per share of the cancelled award.

(g) Conditions on Delivery of Stock. The Company will not be obligated to deliver any shares of Common Stock pursuant to the Plan or to remove restrictions from shares previously delivered under the Plan until (i) all conditions of the Award have been met or removed to the satisfaction of the Company, (ii) in the opinion of the Company's counsel, all other legal matters in connection with the issuance and delivery of such shares have been satisfied, including any applicable securities laws and any applicable stock exchange or stock market rules and regulations, and (iii) the Participant has executed and delivered to the Company such representations or agreements as the Company may consider appropriate to satisfy the requirements of any applicable laws, rules, regulations or contracts of the Company.

(h) Acceleration. The Board may at any time provide that any Award shall become immediately exercisable in full or in part, free of some or all restrictions or conditions, or otherwise realizable in full or in part, as the case may be.

10. Miscellaneous

(a) No Right To Employment or Other Status. No person shall have any claim or right to be granted an Award, and the grant of an Award shall not be construed as giving a Participant the right to continued employment or any other relationship with the Company. The Company expressly reserves the right at any time to dismiss or otherwise terminate its relationship with a Participant free from any liability or claim under the Plan, except as expressly provided in the applicable Award.

(b) No Rights As Stockholder. Subject to the provisions of the applicable Award, no Participant or Designated Beneficiary shall have any rights as a stockholder with respect to any shares of Common Stock to be distributed with respect to an Award until becoming the record holder of such shares. Notwithstanding the foregoing, in the event the Company effects a split of the Common Stock by means of a stock dividend or otherwise and the exercise price of and the number of shares subject to such Option are adjusted as of the effective date of the stock dividend or split (rather than as of the record date for such stock dividend or split), then an optionee who exercises an Option between the record date and the distribution date for such stock dividend or split shall be entitled to receive, on the distribution date, the stock dividend or split with respect to the shares of Common Stock acquired upon such Option exercise, notwithstanding the fact that such shares were not outstanding as of the close of business on the record date for such stock dividend or split.

(c) Effective Date and Term of Plan. The Plan shall become effective on the date on which it is adopted by the Board. No Awards shall be granted under the Plan after the expiration of ten (10) years from the earlier of (i) the date on which the Plan was adopted by the Board or (ii) the date the Plan was approved by the Company's stockholders, but Awards previously granted may extend beyond that date.

(d) Amendment of Plan. The Board may amend, suspend or terminate the Plan or any portion thereof at any time; provided, however, that if at any time the approval of the Company's stockholders is required as to any modification or amendment under Section 422 of the Code or any successor provision with respect to Incentive Stock Options, the Board may not effect such modification or amendment without such approval. Unless otherwise specified in the amendment, any amendment to the Plan adopted in accordance with this Section 10(d) shall apply to, and be binding on the holders of, all Awards outstanding under the Plan at the time the amendment is adopted, provided the Board determines that such amendment does not materially and adversely affect the rights of Participants under the Plan.

(e) Authorization of Sub-Plans. The Board may from time to time establish one or more sub-plans under the Plan for purposes of satisfying applicable blue sky, securities or tax laws of various jurisdictions. The Board shall establish such sub-plans by adopting supplements to this Plan containing (i) such limitations on the Board's discretion under the Plan as the Board deems necessary or desirable or (ii) such additional terms and conditions not otherwise inconsistent with the Plan as the Board shall deem necessary or desirable. All supplements adopted by the Board shall be deemed to be part of the Plan, but each supplement shall apply only to Participants within the affected jurisdiction and the Company shall not be required to provide copies of any supplement to Participants in any jurisdiction which is not the subject of such supplement.

(f) Compliance with Code Section 409A. It is intended that all Awards granted hereunder be either exempt from, or issued in compliance with, Code Section 409A. The Company shall have no liability to a Participant, or any other party, if an Award that is intended to be exempt from, or compliant with, Code Section 409A is not so exempt or compliant, or for any action taken by the Board.

(g) Governing Law. The provisions of the Plan and all Awards made hereunder shall be governed by and construed in accordance with the laws of the State of North Carolina without reference to conflict of law provisions.

* * * * * * * *

PRECISION BIOSCIENCES, INC.
FIRST AMENDMENT OF 2015 STOCK INCENTIVE PLAN

THIS FIRST AMENDMENT of Precision BioSciences, Inc. 2015 Stock Incentive Plan is dated as of May 24, 2018.

WHEREAS, the Board of Directors of Precision BioSciences, Inc. (the "**Company**") has adopted and the stockholders of the Company have approved the Precision Biosciences, Inc. 2015 Stock Incentive Plan (the "**Plan**"); and

WHEREAS, the Board of Directors determines that it is in the best interests of the Company and the Company's stockholders to amend the Plan in order to increase the number of shares of common stock issuable pursuant to Awards (as defined in the Plan) made under the Plan from eleven million two hundred fifty thousand (11,250,000) shares to Seventeen Million Five Hundred Thirty Thousand (17,530,000) shares.

NOW, THEREFORE, the Plan shall be amended as follows:

1. The first sentence of Section 4(a) of the Plan shall be deleted in its entirety and the following substituted in lieu thereof:

"Subject to adjustment under Section 8, Awards may be made under the Plan for up to Seventeen Million Five Hundred Thirty Thousand (17,530,000) shares of the Company's common stock, $0.000005 par value per share (the "**Common Stock**")."

2. Except as herein amended, the terms and provisions of the Plan shall remain in full force and effect as originally adopted and approved.

[Signature page follows.]

IN WITNESS WHEREOF, the undersigned hereby certifies that this First Amendment was duly adopted by the Board of Directors of the Company as of May 24, 2018.

PRECISION BIOSCIENCES, INC.

By: /s/ Matt Kane
Matthew Kane
President and Chief Executive Officer

EXHIBIT A

Notice of Nonstatutory Stock Option
and
Nonstatutory Stock Option Agreement

PRECISION BIOSCIENCES, INC.
NOTICE OF NONSTATUTORY STOCK OPTION
PRECISION BIOSCIENCES, INC. 2015 STOCK INCENTIVE PLAN

Precision BioSciences, Inc., a Delaware corporation (the "**Company**"), grants to the undersigned (the "**Participant**") the following nonstatutory stock option to purchase shares (the "**Shares**") of the common stock of the Company, $0.000005 par value per share (the "**Common Stock**"), pursuant to the Precision BioSciences, Inc. 2015 Stock Incentive Plan (the "**Plan**"):

Participant:	***[**Participant Name**]**
Total Number of Shares:	***[**Number of Shares**]**
Grant Date:	***[**Grant Date**]**
Exercise Price per Share:	$***[**Exercise Price (Must Be at Least FMV at Grant**]**
Vesting Commencement Date:	***[**Vesting Commencement Date**]**
Vesting Schedule:	***[%]*** of the Total Number of Shares shall vest and become exercisable on the ***[first]*** anniversary of the Vesting Commencement Date and an additional ***[ ]***% of the Total Number of Shares shall vest and become exercisable at the end of each successive three-month period following the first anniversary of the Vesting Commencement Date until the ***[fourth]*** anniversary of the Vesting Commencement Date, subject to the Participant remaining a Service Provider through each such vesting date.
Final Exercise Date:	***[**Expiration Date**]**. This option may expire earlier pursuant to Section 3 of the Nonstatutory Stock Option Agreement if the Participant's relationship with the Company is terminated, or pursuant to Section 9 of the Plan.

This nonstatutory stock option is granted under and governed by the terms and conditions of the Plan and accompanying Nonstatutory Stock Option Agreement, both of which are incorporated herein by reference. By signing below, the Participant accepts this nonstatutory stock option, acknowledges receipt of a copy of the Plan and the Nonstatutory Stock Option Agreement, and agrees to the terms thereof.

***[PARTICIPANT NAME]**

_____
(Signature)

Address: _____

_____

PRECISION BIOSCIENCES, INC.

By: _____

Name: _____

Title: _____

Date: _____

THE OPTION GRANTED PURSUANT TO THIS AGREEMENT AND THE SHARES ISSUABLE UPON THE EXERCISE THEREOF HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, OR ANY STATE SECURITIES LAWS, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION THEREOF UNDER SUCH ACT OR APPLICABLE LAWS OR AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY AND ITS COUNSEL THAT SUCH REGISTRATION IS NOT REQUIRED.

PRECISION BIOSCIENCES, INC.

NONSTATUTORY STOCK OPTION AGREEMENT
Granted Under the Precision BioSciences, Inc. 2015 Stock Incentive Plan

1. Grant of Option.

This Nonstatutory Stock Option Agreement (the "**Agreement**") evidences the grant by Precision BioSciences, Inc., a Delaware corporation (the "**Company**"), on the Grant Date to the Participant, a**[**n**]** ***[**employee/officer/director/consultant/advisor**]** of the Company, of an option (this "**Option**") to purchase, in whole or in part, on the terms provided herein and in the Plan, the Total Number of Shares of Common Stock at the Exercise Price per Share, all as defined and set forth in the accompanying Notice of Nonstatutory Stock Option (the "**Notice**"). Capitalized terms that are not otherwise defined herein or in the Notice shall have the meanings given to such terms in the Plan.

It is intended that this Option shall not be an incentive stock option as defined in Section 422 of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "**Code**"). Except as otherwise indicated by the context, the term "Participant," as used in this Agreement, shall include any person who acquires the right to exercise this Option validly under its terms.

2. Vesting Schedule.

This Option shall vest and become exercisable at the time or times set forth in the accompanying Notice**.** [In addition, the Option may vest and become exercisable on an accelerated basis as follows:

Immediately prior to the effective date of a Change in Control, one hundred percent (100%) of the Total Number of Shares subject to this Option shall vest and become fully exercisable; provided, however, that in no event shall the Participant be entitled to exercise the Option to purchase greater than the Total Number of Shares as a result of this provision. Such accelerated vesting shall be contingent upon consummation of the Change in Control.]

3. Exercise of Option.

(a) Form of Exercise. Each election to exercise this Option shall be in writing in substantially the form of the Notice of Stock Option Exercise attached to this Agreement as **Exhibit A**, signed by the Participant, and received by the Company at its principal office, accompanied by this Agreement, and payment in full in the manner provided in the Plan. The Participant may purchase less than the number of Shares subject to this Option; provided that, no partial exercise of this Option may be for any fractional share.

(b) Continuous Relationship with the Company Required. Except as otherwise provided in this Section 3, this Option may not be exercised unless the Participant, at the time of the exercise of this

Option, is, and has been at all times since the Grant Date, a Service Provider to or of the Company or any subsidiary of the Company as defined in Section 424 (f) of the Code (an "**Eligible Participant**").

(c) Termination of Relationship with the Company. If the Participant ceases to be an Eligible Participant for any reason, then, except as provided in paragraphs (d) and (e) below, the right to exercise this Option shall terminate three (3) months after such cessation (but in no event after the Final Exercise Date); provided that, this Option shall be exercisable only to the extent that the Participant was entitled to exercise this Option on the date of such cessation. Notwithstanding the foregoing, if the Participant, prior to the Final Exercise Date, violates the non-competition or confidentiality provisions of any employment agreement, confidentiality and nondisclosure agreement, or other agreement between the Participant and the Company, the right to exercise this Option shall terminate immediately upon such violation.

(d) Exercise Period Upon Death or Disability. If the Participant dies or becomes disabled (within the meaning of Section 22(e)(3) of the Code) prior to the Final Exercise Date while the Participant is an Eligible Participant and the Company has not terminated such relationship for "Cause" (as defined below), this Option shall be exercisable, within the period of one year following the date of death or disability of the Participant, by the Participant (or in the case of death by an authorized transferee); provided that, this Option shall be exercisable only to the extent that this Option was exercisable by the Participant on the date of the Participant's death or disability, and further provided that this Option shall not be exercisable after the Final Exercise Date.

(e) Termination for Cause. If, prior to the Final Exercise Date, the Participant's status as a Service Provider is terminated by the Company for "Cause" (as such term is defined below), the right to exercise this Option shall terminate immediately upon the effective date of such termination. If the Participant is party to an employment agreement or other agreement with the Company that contains an applicable definition of "cause," then the term "**Cause**" for purposes of this Agreement shall have the meaning ascribed to such term in such agreement. Otherwise, the term "**Cause**" for purposes of this Agreement shall mean the following: (i) Participant's willful failure to perform Participant's duties; (ii) Participant's gross negligence or willful misconduct in the execution of Participant's duties; (iii) Participant's failure or refusal to comply with the Company's policies, procedures, practices, or directions; (iv) Participant's conviction of, or guilty plea as to, a felony or any crime involving fraud, misappropriation, or misrepresentation; or (v) Participant's breach (and subsequent failure to cure upon applicable notice) of any employment, consulting, advisory, nondisclosure, non-competition or other similar agreement between the Participant and the Company, as determined by the Company, which determination shall be conclusive. The Participant shall be considered to have been discharged for "Cause" if the Company determines, within 30 days after the Participant's resignation, that discharge for cause was warranted.

4. Bylaws; General Restrictions on Transfer.

The Participant acknowledges and agrees that the Shares are subject to the provisions of the Company's Bylaws, as amended from time to time (the "**Bylaws**"), including without limitation, any restrictions on transfer described in the Bylaws. The Participant may inspect the Bylaws at the Company's principal office.

5. Rights of First Refusal.

(a) If Participant proposes to sell, pledge or otherwise transfer any Shares acquired upon exercise of this Option (the "**Exercise Shares**"), the Company shall have the right to repurchase the Exercise Shares under the terms and subject to the conditions set forth in this Section 5 (the "**Right of First Refusal**").

(b) Notice of Proposed Transfer. Prior to any proposed transfer of the Exercise Shares, the Participant shall give a written notice (the "**Transfer Notice**") to the Company describing fully the proposed transfer, including the number of Exercise Shares, the name and address of the proposed transferee (the "**Proposed Transferee**"), the proposed transfer price and all other material terms and conditions of the proposed transfer.

(c)Exercise of Right of First Refusal. The Company shall have the right to purchase all, but not less than all, of the Exercise Shares at the purchase price and on the terms set forth in the Transfer Notice by delivery to the Participant of a notice of exercise of the Right of First Refusal within thirty (30) days after the date the Transfer Notice is delivered to the Company. The Company's exercise or failure to exercise the Right of First Refusal with respect to any proposed transfer described in a Transfer Notice shall not affect the Company's ability to exercise the Right of First Refusal with respect to any proposed transfer described in any other Transfer Notice, whether or not such other Transfer Notice is issued by the Participant or issued by any other person with respect to a proposed transfer to the same Proposed Transferee. If the Company exercises the Right of First Refusal, the Company and the Participant shall thereupon consummate the sale of the Exercise Shares to the Company on the terms set forth in the Transfer Notice; provided however, that if the Transfer Notice provides for the payment for the Exercise Shares other than in cash, the Company shall have the option of paying for the Exercise Shares by the discounted cash equivalent of the consideration described in the Transfer Notice as reasonably determined by the Board. For purposes of the foregoing, cancellation of any indebtedness of the Participant to the Company shall be treated as payment to the Participant in cash to the extent of the unpaid principal and any accrued interest cancelled.

(d) Failure to Exercise Right of First Refusal. If the Company fails to exercise such Right of First Refusal, the Participant may conclude a transfer to the Proposed Transferee of the Exercise Shares on the terms and conditions described in the Transfer Notice, provided such transfer occurs not later than three (3) months following expiration of the forty-five (45) day Right of First Refusal period provided in Section 5(c). Any proposed transfer on terms and conditions different from those described in the Transfer Notice, as well as any subsequent proposed transfer by the Participant, also shall be subject to the Right of First Refusal and shall require compliance by the Participant with the procedure described in this Section 5.

(e) Transferees of the Transfer Shares. All transferees of the Exercise Shares or any interest therein, other than the Company acquiring such Exercise Shares through its Right of First Refusal, shall be required as a condition of such transfer to agree in writing (in a form satisfactory to the Company) that such transferee shall receive and hold such Exercise Shares or interests subject to (i) the provisions of this Section 5 providing for the Right of First Refusal with respect to any subsequent transfer, (ii) the Right of Repurchase established under Section 6, and (iii) all other applicable restrictions set forth in the Plan and this Agreement.

(f) Transfers Not Subject to the Right of First Refusal. The Right of First Refusal shall not apply to any transfer or exchange of the Exercise Shares if: (i) such transfer is in connection with a Change in Control; (ii) such transfer is to one or more members of the Participant's immediate family (or a trust for their benefit) provided all such transferees agree in writing to the restrictions of Section 5(f); or (iii) such transfer has been expressly approved by the Board, which approval may be granted or withheld in its sole discretion.

(g) Assignment of the Right of First Refusal. The Company shall have the right to assign the Right of First Refusal at any time.

(h) Stock Dividends Subject to First Refusal Right. If, from time to time, there is any stock dividend, stock split, recapitalization, reclassification or other change in the character or amount of any of the outstanding stock of the Company, the stock of which is subject to the provisions of an Option issued pursuant to the Plan, then, in such event, any and all new substituted or additional securities to which the Participant is entitled by reason of the Participant's ownership of the Exercise Shares shall be immediately subject to the Right of First Refusal with the same force and effect as the Shares subject to the Right of First Refusal immediately before such event.

(i) Early Termination of the Right of First Refusal. The other provisions of this Section 5 notwithstanding, the Right of First Refusal shall terminate, and be of no further force and effect, upon the earlier of (i) the occurrence of a Change in Control, unless the surviving, continuing, successor, or purchasing corporation, as the case may be, assumes the Company's rights and obligations under the Plan, or (ii) the existence of a public market for the Shares. A "public market" shall be deemed to exist if (i) Shares are listed on a national securities exchange (as that term is used in the Exchange Act) or (ii) Shares are traded on the over-the-counter market and prices therefor are published daily on business days in a recognized financial journal.

(j) Escrow. To ensure the Shares subject to Right of First Refusal will be available for purchase, the Company may require a Participant to deposit certificates evidencing the Exercise Shares in escrow with the Company or an agent of the Company.

6. Right of Repurchase on Termination of Employment With or Cessation of Service to the Company. The Company shall have the right (but not the obligation) to repurchase any or all of the Exercise Shares upon the Participant's termination of employment or service as a Service Provider of the Company for any reason. The price per Exercise Share to be paid by the Company should it choose to exercise its repurchase right under this Section 6 shall equal the then Fair Market Value per Exercise Share. The Company's right of repurchase pursuant to this Section 6 shall commence on the date the Participant terminates service with the Company and continue until the first anniversary of such Participant's termination of service.

7. Legend. Any certificate representing Shares shall bear legends substantially in the following forms (in addition to, or in combination with, any legend required by applicable federal and state securities laws and other agreements relating to the Company's securities):

> "The securities represented by this certificate, and the transfer thereof, are subject to the restriction on transfer provisions of the Bylaws of the Company and the Nonstatutory Stock Option Agreement, copies of which are on file in, and may be examined at, the principal office of the Company."

8. Agreement in Connection with Public Offering.

The Participant agrees, in connection with the initial underwritten public offering of the Company's securities pursuant to a registration statement under the Securities Act of 1933, as amended (the "**Securities Act**"): (i) not to sell, make short sale of, loan, grant any options for the purchase of, or otherwise dispose of any shares of Common Stock held by the Participant (other than those shares included in the offering) without the prior written consent of the Company or the underwriters managing such initial underwritten public offering of the Company's securities for a period of 180 days from the effective date of such registration statement, which period may be extended upon the request of the underwriters for an additional period of up to fifteen (15) days if the Company issues or proposes to issue

an earnings or other public release within fifteen (15) days of the expiration of the 180-day lockup period, and (ii) to execute any agreement reflecting clause (i) above as may be requested by the Company or the managing underwriters at the time of such offering.

The Participant agrees to execute and deliver such other agreements as may be reasonably requested by the Company or the underwriters of such offering which are consistent with the foregoing or which are necessary to give further effect thereto. In addition, if requested, by the Company or the underwriters of such offering, the Participant shall provide, within 10 days of such request, such information as may be required by the Company or such underwriters in connection with the completion of any public offering of the Company's securities pursuant to a registration statement filed under the Securities Act. The obligations described in this Section 8 shall not apply to a registration relating solely to employee benefits plans on Form S-1 or Form S-8 or similar forms that may be promulgated in the future, or a registration relating solely to a Commission Rule 145 transaction on Form S-4 or similar forms that may be promulgated in the future. The Company may impose stop-transfer instructions with respect to the shares of Common Stock (or other securities) subject to the foregoing restriction until the end of the applicable period. Participant agrees that any transferee of this Option or Shares pursuant to this Agreement shall be bound by this Section 8.

9. Tax Matters.

(a) Withholding. No Shares shall be issued pursuant to the exercise of this Option unless and until the Participant pays to the Company, or makes provision satisfactory to the Company for payment of, any federal, state or local withholding or other taxes required by law to be withheld in respect of this Option.

(b) Code Section 409A. The Exercise Price is intended to be not less than the Fair Market Value of the Common Stock on the Grant Date. The Company has determined the Fair Market Value of the Common Stock in good faith and using the reasonable application of a reasonable valuation method, for purposes of determining the Exercise Price. Notwithstanding this, the Internal Revenue Service may assert that the Fair Market Value of the Common Stock on the Grant Date was greater than the Exercise Price. Under Code Section 409A, if the Exercise Price is less than the Fair Market Value of the Common Stock as of the Grant Date, this Option may be treated as a form of deferred compensation and the Participant may be subject to an additional twenty percent (20%) tax, plus interest and possible penalties. The Participant acknowledges that the Company has advised the Participant to consult with a tax adviser regarding the potential impact of Code Section 409A and that the Company, in the exercise of its sole discretion and without the consent of the Participant, may amend or modify this Agreement in any manner and delay the payment of any amounts payable pursuant to this Agreement to the minimum extent necessary to meet the requirements of Code Section 409A, as amplified by any Internal Revenue Service or U.S. Treasury Department regulations or guidance as the Company deems appropriate or advisable.

10. Nontransferability of Option. This Option may not be sold, assigned, transferred, pledged or otherwise encumbered by the Participant, either voluntarily or by operation of law, except by will or the laws of descent and distribution, and, during the lifetime of the Participant, this Option shall be exercisable only by the Participant.

11. Provisions of the Plan. This Option is subject to the provisions of the Plan, a copy of which is furnished to the Participant with this Option.

12. Entire Agreement; Governing Law. The Plan and the Notice are incorporated herein by reference. This Agreement, the Notice and the Plan constitute the entire agreement between the Company and the Participant with respect to the subject matter hereof and supersede in their entirety all prior undertakings and agreements of the Company and the Participant with respect to the subject matter

hereof. This Agreement shall be governed by and construed in accordance with the laws of the State of North Carolina without reference to conflict of law provisions.

13. Amendment. Except as set forth in Section 9(b), this Agreement may not be modified or amended in any manner adverse to the Participant's interest except by means of a writing signed by the Company and Participant.

14. No Guarantee of Continued Service. THE PARTICIPANT ACKNOWLEDGES AND AGREES THAT THE VESTING OF OPTIONS PURSUANT TO THE VESTING SCHEDULE SET FORTH HEREIN AND IN THE NOTICE ARE EARNED ONLY BY CONTINUING SERVICE AT THE WILL OF THE COMPANY (NOT THROUGH THE ACT OF BEING HIRED, BEING GRANTED THIS OPTION OR ACQUIRING SHARES HEREUNDER). THE PARTICIPANT FURTHER ACKNOWLEDGES AND AGREES THAT THIS AGREEMENT, THE TRANSACTIONS CONTEMPLATED HEREUNDER AND THE VESTING SCHEDULE SET FORTH HEREIN DO NOT CONSTITUTE AN EXPRESS OR IMPLIED PROMISE OF CONTINUED SERVICE FOR THE VESTING PERIOD, FOR ANY PERIOD, OR AT ALL, AND SHALL NOT INTERFERE IN ANY WAY WITH PARTICIPANT'S RIGHT OR THE COMPANY'S RIGHT TO TERMINATE PARTICIPANT'S SERVICE WITH OR WITHOUT CAUSE.

* * * * * * * * * * *

Exhibit A

PRECISION BIOSCIENCES, INC.

NOTICE OF NONSTATUTORY STOCK OPTION EXERCISE
PRECISION BIOSCIENCES, INC. 2015 STOCK INCENTIVE PLAN

The undersigned (the "**Participant**") has previously been awarded a nonstatutory stock option (the "**Option**") to purchase shares (the "**Shares**") of the common stock of Precision BioSciences, Inc., a Delaware corporation (the "**Company**"), pursuant to the Precision BioSciences, Inc. 2015 Stock Incentive Plan (the "**Plan**"), and hereby notifies the Company of the Participant's desire to exercise the Option on the terms set forth herein:

PARTICIPANT INFORMATION:

Name: _____

Address: _____

_____

Taxpayer ID #: _____

OPTION INFORMATION:

Grant Date: _____

Exercise Price Per Share: $_____

Total Shares Covered by Option: _____

EXERCISE INFORMATION:

Number of Shares Being Purchased: _____

Aggregate Exercise Price: $_____

Form of Payment (check all that apply): ☐ Check for $_____ made payable to the Company

☐ Cash in the amount of $_____

Please register the Shares in my name as follows: _____

(Print name as it is to appear on stock certificate)

REPRESENTATIONS AND WARRANTIES OF THE PARTICIPANT:

The Participant hereby represents and warrants to the Company that, as of the date hereof:

1. I am purchasing the Shares for my own account for investment only, and not with a view to, or for sale in connection with, any distribution of the Shares in violation of the Securities Act of 1933 (the "**Securities Act**"), or any rule or regulation under the Securities Act.

2. I have had such opportunity as I have deemed adequate to obtain from representatives of the Company such information as is necessary to permit me to evaluate the merits and risks of my investment in the Company.

3. I have sufficient experience in business, financial and investment matters to be able to evaluate the risks involved in the purchase of the Shares and to make an informed investment decision with respect to such purchase.

4. I can afford a complete loss of the value of the Shares and am able to bear the economic risk of holding such Shares for an indefinite period.

5. I acknowledge that I am acquiring the Shares subject to all other terms of the Plan, including the Notice of Nonstatutory Stock Option and related Nonstatutory Stock Option Agreement.

6. I acknowledge that the Company has encouraged me to consult my own adviser to determine the tax consequences of acquiring the Shares at this time. I acknowledge that the Company has encouraged me to consult my own adviser to determine the form of ownership that is appropriate for me.

7. I acknowledge that the Shares remain subject to the Company's right of first refusal, right of repurchase, voting agreement and proxy, and the market stand-off (sometimes referred to as the "lock-up"), all in accordance with the applicable Notice of Nonstatutory Stock Option and related Nonstatutory Stock Option Agreement.

8. I understand that (i) the Shares have not been registered under the Securities Act and are "restricted securities" within the meaning of Rule 144 under the Securities Act, (ii) the Shares cannot be sold, transferred or otherwise disposed of unless they are subsequently registered under the Securities Act or an exemption from registration is then available; (iii) in any event, the exemption from registration under Rule 144 will not be available for at least one year and even then will not be available unless a public market then exists for the Common Stock, adequate information concerning the Company is then available to the public, and other terms and conditions of Rule 144 are complied with; and (iv) there is now no registration statement on file with the Securities and Exchange Commission with respect to any stock of the Company and the Company has no obligation or current intention to register the Shares under the Securities Act.

_____

(Print Participant Name)

_____

(Signature)

Date: _____

EXHIBIT B

Notice of Incentive Stock Option
and
Incentive Stock Option Agreement

THE OPTION GRANTED PURSUANT TO THIS AGREEMENT AND THE SHARES ISSUABLE UPON THE EXERCISE THEREOF HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, OR ANY STATE SECURITIES LAWS, AND MAY NOT BE SOLD, PLEDGED OR OTHERWISE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION THEREOF UNDER SUCH ACT OR APPLICABLE LAWS OR AN OPINION OF COUNSEL SATISFACTORY TO THE COMPANY AND ITS COUNSEL THAT SUCH REGISTRATION IS NOT REQUIRED.

PRECISION BIOSCIENCES, INC.

INCENTIVE STOCK OPTION AGREEMENT
Granted Under the Precision BioSciences, Inc. 2015 Stock Incentive Plan

1. Grant of Option.

This Incentive Stock Option Agreement (the "**Agreement**") evidences the grant by Precision BioSciences, Inc., a Delaware corporation (the "**Company**"), on the Grant Date to the Participant, an employee of the Company, of an option (this "**Option**") to purchase, in whole or in part, on the terms provided herein and in the Plan, the Total Number of Shares of Common Stock at the Exercise Price per Share, all as defined and set forth in the accompanying Notice of Incentive Stock Option (the "**Notice**"). Capitalized terms that are not otherwise defined herein or in the Notice shall have the meanings given to such terms in the Plan.

It is intended that this Option shall be an incentive stock option as defined in Section 422 of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "**Code**"). If for any reason the Option, or any portion thereof, does not meet the requirements of Section 422 of the Code, then the Option, or any portion thereof, as necessary, shall be deemed a nonstatutory stock option granted under the Plan. Except as otherwise indicated by the context, the term "Participant," as used in this Agreement, shall include any person who acquires the right to exercise this Option validly under its terms.

2. Vesting Schedule.

This Option shall vest and become exercisable at the time or times set forth in the accompanying Notice. [In addition, the Option may vest and become exercisable on an accelerated basis as follows:

Immediately prior to the effective date of a Change in Control, one hundred percent (100%) of the Total Number of Shares subject to this Option shall vest and become fully exercisable; provided, however, that in no event shall the Participant be entitled to exercise the Option to purchase greater than the Total Number of Shares as a result of this provision. Such accelerated vesting shall be contingent upon consummation of the Change in Control.]

3. Exercise of Option.

(a) Form of Exercise. Each election to exercise this Option shall be in writing in substantially the form of the Notice of Stock Option Exercise attached to this Agreement as **Exhibit A**, signed by the Participant, and received by the Company at its principal office, accompanied by this Agreement, and payment in full in the manner provided in the Plan. The Participant may purchase less than the number of Shares subject to this Option; provided that, no partial exercise of this Option may be for any fractional share.

(b) Continuous Relationship with the Company Required. Except as otherwise provided in this Section 3, this Option may not be exercised unless the Participant, at the time of the exercise of this Option, is, and has been at all times since the Grant Date, a Service Provider to or of the Company or any subsidiary of the Company as defined in Section 424 (f) of the Code (an "**Eligible Participant**").

(c) Termination of Relationship with the Company. If the Participant ceases to be an Eligible Participant for any reason, then, except as provided in paragraphs (d) and (e) below, the right to exercise this Option shall terminate three (3) months after such cessation (but in no event after the Final Exercise Date); provided that, this Option shall be exercisable only to the extent that the Participant was entitled to exercise this Option on the date of such cessation. Notwithstanding the foregoing, if the Participant, prior to the Final Exercise Date, violates the non-competition or confidentiality provisions of any employment agreement, confidentiality and nondisclosure agreement, or other agreement between the Participant and the Company, the right to exercise this Option shall terminate immediately upon such violation.

(d) Exercise Period Upon Death or Disability. If the Participant dies or becomes disabled (within the meaning of Section 22(e)(3) of the Code) prior to the Final Exercise Date while the Participant is an Eligible Participant and the Company has not terminated such relationship for "Cause" (as defined below), this Option shall be exercisable, within the period of one year following the date of death or disability of the Participant, by the Participant (or in the case of death by an authorized transferee); provided that, this Option shall be exercisable only to the extent that this Option was exercisable by the Participant on the date of the Participant's death or disability, and further provided that this Option shall not be exercisable after the Final Exercise Date.

(e) Termination for Cause. If, prior to the Final Exercise Date, the Participant's status as a Service Provider is terminated by the Company for "Cause" (as such term is defined below), the right to exercise this Option shall terminate immediately upon the effective date of such termination. If the Participant is party to an employment agreement or other agreement with the Company that contains an applicable definition of "cause," then the term "**Cause**" for purposes of this Agreement shall have the meaning ascribed to such term in such agreement. Otherwise, the term "**Cause**" for purposes of this Agreement shall mean the following: (i) Participant's willful failure to perform Participant's duties; (ii) Participant's gross negligence or willful misconduct in the execution of Participant's duties; (iii) Participant's failure or refusal to comply with the Company's policies, procedures, practices or directions; (iv) Participant's conviction of, or guilty plea as to, a felony or any crime involving, fraud, misappropriation, or misrepresentation; or (v) Participant's breach (and subsequent failure to cure upon applicable notice) of any employment, consulting, advisory, nondisclosure, non-competition or other similar agreement between the Participant and the Company, as determined by the Company, which determination shall be conclusive. The Participant shall be considered to have been discharged for "Cause" if the Company determines, within 30 days after the Participant's resignation, that discharge for cause was warranted.

4. Bylaws; General Restrictions on Transfer.

The Participant acknowledges and agrees that the Shares are subject to the provisions of the Company's Bylaws, as amended from time to time (the "**Bylaws**"), including without limitation, any restrictions on transfer described in the Bylaws. The Participant may inspect the Bylaws at the Company's principal office.

5. Rights of First Refusal.

(a) If Participant proposes to sell, pledge or otherwise transfer any Shares acquired upon exercise of this Option (the "**Exercise Shares**"), the Company shall have the right to repurchase the Exercise Shares under the terms and subject to the conditions set forth in this Section 5 (the "**Right of First Refusal**").

(b) Notice of Proposed Transfer. Prior to any proposed transfer of the Exercise Shares, the Participant shall give a written notice (the "**Transfer Notice**") to the Company describing fully the proposed transfer, including the number of Exercise Shares, the name and address of the proposed transferee (the "**Proposed Transferee**"), the proposed transfer price and all other material terms and conditions of the proposed transfer.

(c)Exercise of Right of First Refusal. The Company shall have the right to purchase all, but not less than all, of the Exercise Shares at the purchase price and on the terms set forth in the Transfer Notice by delivery to the Participant of a notice of exercise of the Right of First Refusal within thirty (30) days after the date the Transfer Notice is delivered to the Company. The Company's exercise or failure to exercise the Right of First Refusal with respect to any proposed transfer described in a Transfer Notice shall not affect the Company's ability to exercise the Right of First Refusal with respect to any proposed transfer described in any other Transfer Notice, whether or not such other Transfer Notice is issued by the Participant or issued by any other person with respect to a proposed transfer to the same Proposed Transferee. If the Company exercises the Right of First Refusal, the Company and the Participant shall thereupon consummate the sale of the Exercise Shares to the Company on the terms set forth in the Transfer Notice; provided however, that if the Transfer Notice provides for the payment for the Exercise Shares other than in cash, the Company shall have the option of paying for the Exercise Shares by the discounted cash equivalent of the consideration described in the Transfer Notice as reasonably determined by the Board. For purposes of the foregoing, cancellation of any indebtedness of the Participant to the Company shall be treated as payment to the Participant in cash to the extent of the unpaid principal and any accrued interest cancelled.

(d) Failure to Exercise Right of First Refusal. If the Company fails to exercise such Right of First Refusal, the Participant may conclude a transfer to the Proposed Transferee of the Exercise Shares on the terms and conditions described in the Transfer Notice, provided such transfer occurs not later than three (3) months following expiration of the forty-five (45) day Right of First Refusal period provided in Section 5(c). Any proposed transfer on terms and conditions different from those described in the Transfer Notice, as well as any subsequent proposed transfer by the Participant, also shall be subject to the Right of First Refusal and shall require compliance by the Participant with the procedure described in this Section 5.

(e) Transferees of the Transfer Shares. All transferees of the Exercise Shares or any interest therein, other than the Company acquiring such Exercise Shares through its Right of First Refusal, shall be required as a condition of such transfer to agree in writing (in a form satisfactory to the Company) that such transferee shall receive and hold such Exercise Shares or interests subject to (i) the provisions of this Section 5 providing for the Right of First Refusal with respect to any subsequent transfer, (ii) the Right of Repurchase established under Section 6, and (iii) all other applicable restrictions set forth in the Plan and this Agreement.

(f) Transfers Not Subject to the Right of First Refusal. The Right of First Refusal shall not apply to any transfer or exchange of the Exercise Shares if: (i) such transfer is in connection with a Change in Control; (ii) such transfer is to one or more members of the Participant's immediate family (or a trust for their benefit) provided all such transferees agree in writing to the restrictions of Section 5(e); or

(iii) such transfer has been expressly approved by the Board, which approval may be granted or withheld in its sole discretion.

(g) Assignment of the Right of First Refusal. The Company shall have the right to assign the Right of First Refusal at any time.

(h) Stock Dividends Subject to First Refusal Right. If, from time to time, there is any stock dividend, stock split, recapitalization, reclassification or other change in the character or amount of any of the outstanding stock of the Company, the stock of which is subject to the provisions of an Option issued pursuant to the Plan, then, in such event, any and all new substituted or additional securities to which the Participant is entitled by reason of the Participant's ownership of the Exercise Shares shall be immediately subject to the Right of First Refusal with the same force and effect as the Shares subject to the Right of First Refusal immediately before such event.

(i) Early Termination of the Right of First Refusal. The other provisions of this Section 5 notwithstanding, the Right of First Refusal shall terminate, and be of no further force and effect, upon the earlier of (i) the occurrence of a Change in Control, unless the surviving, continuing, successor, or purchasing corporation, as the case may be, assumes the Company's rights and obligations under the Plan, or (ii) the existence of a public market for the Shares. A "public market" shall be deemed to exist if (i) Shares are listed on a national securities exchange (as that term is used in the Exchange Act) or (ii) Shares are traded on the over-the-counter market and prices therefor are published daily on business days in a recognized financial journal.

(j) Escrow. To ensure the Shares subject to Right of First Refusal will be available for purchase, the Company may require a Participant to deposit certificates evidencing the Exercise Shares in escrow with the Company or an agent of the Company.

6. Right of Repurchase on Termination of Employment With or Cessation of Service to Company. The Company shall have the right (but not the obligation) to repurchase any or all of the Exercise Shares upon the Participant's termination of employment or service as a Service Provider of the Company for any reason. The price per Exercise Share to be paid by the Company should it choose to exercise its repurchase right under this Section 6 shall equal the then Fair Market Value per Exercise Share. The Company's right of repurchase pursuant to this Section 6 shall commence on the date the Participant terminates service with the Company and continue until the first anniversary of such Participant's termination of service.

7. Legend. Any certificate representing Shares shall bear legends substantially in the following forms (in addition to, or in combination with, any legend required by applicable federal and state securities laws and other agreements relating to the Company's securities):

> "The securities represented by this certificate, and the transfer thereof, are subject to the restriction on transfer provisions of the Bylaws of the Company and the Incentive Stock Option Agreement, copies of which are on file in, and may be examined at, the principal office of the Company."

8. Agreement in Connection with Public Offering. The Participant agrees, in connection with the initial underwritten public offering of the Company's securities pursuant to a registration statement under the Securities Act of 1933, as amended (the "**Securities Act**"): (i) not to sell, make short sale of, loan, grant any options for the purchase of, or otherwise dispose of any shares of Common Stock held by the

Participant (other than those shares included in the offering) without the prior written consent of the Company or the underwriters managing such initial underwritten public offering of the Company's securities for a period of 180 days from the effective date of such registration statement, which period may be extended upon the request of the underwriters for an additional period of up to fifteen (15) days if the Company issues or proposes to issue an earnings or other public release within fifteen (15) days of the expiration of the 180-day lockup period, and (ii) to execute any agreement reflecting clause (i) above as may be requested by the Company or the managing underwriters at the time of such offering.

The Participant agrees to execute and deliver such other agreements as may be reasonably requested by the Company or the underwriters of such offering which are consistent with the foregoing or which are necessary to give further effect thereto. In addition, if requested, by the Company or the underwriters of such offering, the Participant shall provide, within 10 days of such request, such information as may be required by the Company or such underwriters in connection with the completion of any public offering of the Company's securities pursuant to a registration statement filed under the Securities Act. The obligations described in this Section 8 shall not apply to a registration relating solely to employee benefits plans on Form S-1 or Form S-8 or similar forms that may be promulgated in the future, or a registration relating solely to a Commission Rule 145 transaction on Form S-4 or similar forms that may be promulgated in the future. The Company may impose stop-transfer instructions with respect to the shares of Common Stock (or other securities) subject to the foregoing restriction until the end of the applicable period. Participant agrees that any transferee of this Option or Shares pursuant to this Agreement shall be bound by this Section 8.

9. Tax Matters.

(a) Withholding. No Shares shall be issued pursuant to the exercise of this Option unless and until the Participant pays to the Company, or makes provision satisfactory to the Company for payment of, any federal, state or local withholding or other taxes required by law to be withheld in respect of this Option.

(b) Disqualifying Disposition. If the Participant disposes of Shares acquired upon exercise of this Option within two years from the Grant Date or one year after such Shares were acquired pursuant to exercise of this Option, the Participant shall immediately notify the Company in writing of such disposition and shall timely satisfy all resulting tax obligations and shall hold the Company harmless with respect to any such tax obligations.

(c) Code Section 409A. The Exercise Price is intended to be not less than the Fair Market Value of the Common Stock on the Grant Date. The Company has determined the Fair Market Value of the Common Stock in good faith and using the reasonable application of a reasonable valuation method, for purposes of determining the Exercise Price. Notwithstanding this, the Internal Revenue Service may assert that the Fair Market Value of the Common Stock on the Grant Date was greater than the Exercise Price. Under Code Section 409A, if the Exercise Price is less than the Fair Market Value of the Common Stock as of the Grant Date, this Option may be treated as a form of deferred compensation and the Participant may be subject to an additional twenty percent (20%) tax, plus interest and possible penalties. The Participant acknowledges that the Company has advised the Participant to consult with a tax adviser regarding the potential impact of Code Section 409A and that the Company, in the exercise of its sole discretion and without the consent of the Participant, may amend or modify this Agreement in any manner and delay the payment of any amounts payable pursuant to this Agreement to the minimum extent necessary to meet the requirements of Code Section 409A, as amplified by any Internal Revenue Service or U.S. Treasury Department regulations or guidance as the Company deems appropriate or advisable.

10. Nontransferability of Option. This Option may not be sold, assigned, transferred, pledged or otherwise encumbered by the Participant, either voluntarily or by operation of law, except by will or the laws of descent and distribution, and, during the lifetime of the Participant, this Option shall be exercisable only by the Participant.

11. Provisions of the Plan. This Option is subject to the provisions of the Plan, a copy of which is furnished to the Participant with this Option.

12. Entire Agreement; Governing Law. The Plan and the Notice are incorporated herein by reference. This Agreement, the Notice and the Plan constitute the entire agreement between the Company and the Participant with respect to the subject matter hereof and supersede in their entirety all prior undertakings and agreements of the Company and the Participant with respect to the subject matter hereof. This Agreement shall be governed by and construed in accordance with the laws of the State of North Carolina without reference to conflict of law provisions.

13. Amendment. Except as set forth in Section 8(c), this Agreement may not be modified or amended in any manner adverse to the Participant's interest except by means of a writing signed by the Company and Participant.

14. No Guarantee of Continued Service. THE PARTICIPANT ACKNOWLEDGES AND AGREES THAT THE VESTING OF OPTIONS PURSUANT TO THE VESTING SCHEDULE SET FORTH HEREIN AND IN THE NOTICE ARE EARNED ONLY BY CONTINUING SERVICE AT THE WILL OF THE COMPANY (NOT THROUGH THE ACT OF BEING HIRED, BEING GRANTED THIS OPTION OR ACQUIRING SHARES HEREUNDER). THE PARTICIPANT FURTHER ACKNOWLEDGES AND AGREES THAT THIS AGREEMENT, THE TRANSACTIONS CONTEMPLATED HEREUNDER AND THE VESTING SCHEDULE SET FORTH HEREIN DO NOT CONSTITUTE AN EXPRESS OR IMPLIED PROMISE OF CONTINUED SERVICE FOR THE VESTING PERIOD, FOR ANY PERIOD, OR AT ALL, AND SHALL NOT INTERFERE IN ANY WAY WITH PARTICIPANT'S RIGHT OR THE COMPANY'S RIGHT TO TERMINATE PARTICIPANT'S SERVICE WITH OR WITHOUT CAUSE.

* * * * *

Exhibit A

PRECISION BIOSCIENCES, INC.

NOTICE OF INCENTIVE STOCK OPTION EXERCISE
PRECISION BIOSCIENCES, INC. 2015 STOCK INCENTIVE PLAN

The undersigned (the "**Participant**") has previously been awarded an incentive stock option (the "**Option**") to purchase shares (the "**Shares**") of the common stock of Precision BioSciences, Inc., a Delaware corporation (the "**Company**"), pursuant to the Precision BioSciences, Inc. 2015 Stock Incentive Plan (the "**Plan**"), and hereby notifies the Company of the Participant's desire to exercise the Option on the terms set forth herein:

PARTICIPANT INFORMATION:

Name: _____

Address: _____

_____

Taxpayer ID #: _____

OPTION INFORMATION:

Grant Date: _____

Exercise Price Per Share: $_____

Total Shares Covered by Option: _____

EXERCISE INFORMATION:

Number of Shares Being Purchased: _____

Aggregate Exercise Price: $_____

Form of Payment (check all that apply): ☐ Check for $_____ made payable to the Company

☐ Cash in the amount of $_____

Please register the Shares in my name as follows: _____

(Print name as it is to appear on stock certificate)

REPRESENTATIONS AND WARRANTIES OF THE PARTICIPANT:

The Participant hereby represents and warrants to the Company that, as of the date hereof:

1. I am purchasing the Shares for my own account for investment only, and not with a view to, or for sale in connection with, any distribution of the Shares in violation of the Securities Act of 1933 (the "**Securities Act**"), or any rule or regulation under the Securities Act.

2. I have had such opportunity as I have deemed adequate to obtain from representatives of the Company such information as is necessary to permit me to evaluate the merits and risks of my investment in the Company.

3. I have sufficient experience in business, financial and investment matters to be able to evaluate the risks involved in the purchase of the Shares and to make an informed investment decision with respect to such purchase.

4. I can afford a complete loss of the value of the Shares and am able to bear the economic risk of holding such Shares for an indefinite period.

5. I acknowledge that I am acquiring the Shares subject to all other terms of the Plan, including the Notice of Incentive Stock Option and related Incentive Stock Option Agreement.

6. I acknowledge that the Company has encouraged me to consult my own adviser to determine the tax consequences of acquiring the Shares at this time. I acknowledge that the Company has encouraged me to consult my own adviser to determine the form of ownership that is appropriate for me.

7. I acknowledge that the Shares remain subject to the Company's right of first refusal, right of repurchase, voting agreement and proxy, and the market stand-off (sometimes referred to as the "lock-up"), all in accordance with the applicable Notice of Incentive Stock Option and related Incentive Stock Option Agreement.

8. I understand that (i) the Shares have not been registered under the Securities Act and are "restricted securities" within the meaning of Rule 144 under the Securities Act, (ii) the Shares cannot be sold, transferred or otherwise disposed of unless they are subsequently registered under the Securities Act or an exemption from registration is then available; (iii) in any event, the exemption from registration under Rule 144 will not be available for at least one year and even then will not be available unless a public market then exists for the Common Stock, adequate information concerning the Company is then available to the public, and other terms and conditions of Rule 144 are complied with; and (iv) there is now no registration statement on file with the Securities and Exchange Commission with respect to any stock of the Company and the Company has no obligation or current intention to register the Shares under the Securities Act.

_____

(Print Participant Name)

_____

(Signature)

Date:_____

Exhibit 21.1

SUBSIDIARIES OF PRECISION BIOSCIENCES, INC.

Company Name	Jurisdiction
ELO Life Systems, Inc.	Delaware
ELO Life Systems Australia Pty. Ltd.	Australia