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As submitted confidentially to the U.S. Securities and Exchange Commission on December 11, 2018.
This draft registration statement has not been publicly filed with U.S. Securities and Exchange Commission and all information herein remains strictly confidential.

Registration No. 333-

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Amendment No. 1
to
FORM S-1
REGISTRATION STATEMENT

UNDER

THE SECURITIES ACT OF 1933

Poseida Therapeutics, Inc.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	2836	47-3898435
(State or Other Jurisdiction of Incorporation or Organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

Poseida Therapeutics, Inc.
4242 Campus Point Court, Suite 700
San Diego, CA 92121
(858) 779-3100
(Address, Including Zip Code, and Telephone Number, Including Area Code, of Registrant's Principal Executive Offices)

Eric Ostertag, M.D., Ph.D.
Chief Executive Officer
Poseida Therapeutics, Inc.
4242 Campus Point Court, Suite 700
San Diego, CA 92121
(858) 779-3100
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Copies to:

Sean M. Clayton Charles S. Kim Kenneth J. Krisko Cooley LLP 4401 Eastgate Mall San Diego, CA 92121 (858) 550-6000	Mark J. Gergen Chief Business and Financial Officer Poseida Therapeutics, Inc. 4242 Campus Point Court, Suite 700 San Diego, CA 92121 (858) 779-3100	Cheston J. Larson Matthew T. Bush Latham & Watkins LLP 12670 High Bluff Drive San Diego, CA 92130 (858) 523-5400

Approximate date of commencement of proposed sale to the public: As soon as practicable after the effective date of this registration statement.

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, 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, a smaller reporting company or an emerging growth 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 not elected to use the extended transition period for complying with any new or revised financial accounting standards provided in 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, $0.0001 par value per share	$	$

(1) Estimated solely for the purpose of calculating the amount of the registration fee in accordance with Rule 457(o) under the Securities Act, as amended. Includes the offering price of 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 Securities and Exchange 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 we are not soliciting offers to buy these securities in any jurisdiction where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED , 2018

PRELIMINARY PROSPECTUS

Shares

Poseida Therapeutics, Inc.

Common Stock

$ per share

This is the initial public offering of our common stock. We are selling shares of our common stock in this offering. Prior to this offering, there has been no public market for our common stock. We currently expect the initial public offering price to be between $ and $ per share.

We have granted the underwriters an option to purchase up to additional shares of common stock. The underwriters can exercise this option at any time within 30 days after the date of this prospectus.

We have applied to list our common stock on The Nasdaq Global Select Market under the symbol "PSTX."

Investing in our common stock involves risks. See "Risk Factors" beginning on page 13.

We are an "emerging growth company" as defined in the Jumpstart Our Business Act of 2012 and, as such, we have elected to comply with certain reduced reporting requirements for this prospectus and may elect to do so in future filings.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

	Per Share	Total
Public offering price	$	$
Underwriting discounts and commissions(1)	$	$
Proceeds to us (before expenses)	$	$

(1) See the section titled "Underwriting" for additional information regarding underwriting compensation.

The underwriters expect to deliver the shares to purchasers on or about , 2018 through book-entry facilities of The Depository Trust Company.

Citigroup **Credit Suisse** **Wells Fargo Securities**

, 2018

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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 prospectuses prepared by or on behalf of us or to which we have referred you. We and the underwriters 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.

Neither we nor the underwriters have done anything that would permit this offering or possession or distribution of this prospectus or any free writing prospectus we may provide to you in connection with this offering in any jurisdiction where action for that purpose is required, other than in the United States. You are required to inform yourselves about and to observe any restrictions relating to this offering and the distribution of this prospectus and any such free writing prospectus outside of the United States.

TRADEMARKS

This prospectus includes our trademarks, trade names and service marks, such as “piggyBac” and “Cas-CLOVER,” which are protected under applicable intellectual property laws and are our property. This prospectus also contains trademarks, trade names and service marks of other companies, which are the property of their respective owners. Solely for convenience, trademarks, trade names and service marks referred to in this prospectus may appear without the ®, ™ or SM symbols, but such references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or the right of the applicable licensor to such trademarks, trade names and service marks. We do not intend our use or display of other parties’ trademarks, trade names or service marks to imply, and such use or display should not be construed to imply, a relationship with, or endorsement or sponsorship of us by, these other parties.

MARKET, INDUSTRY AND OTHER DATA

Unless otherwise indicated, information contained in this prospectus concerning our industry and the markets in which we operate is based on information from independent industry and research organizations, other third-party sources and management estimates. Management estimates are derived from publicly available information released by independent industry analysts and third-party sources, as well as data from our internal research, and are based on assumptions made by us upon reviewing such data and our knowledge of such industry and markets which we believe to be reasonable. Although we believe the data from these third-party sources is reliable, we have not independently verified any third-party information. In addition, projections, assumptions and estimates of the future performance of the industry in which we operate and our future performance are necessarily subject to uncertainty and risk due to a variety of factors, including those described in the sections titled “Risk Factors” and “Special Note Regarding Forward-Looking Statements.” These and other factors could cause results to differ materially from those expressed in the estimates made by the independent parties and by us.

PROSPECTUS SUMMARY

This summary highlights certain information contained elsewhere in this prospectus. This summary is not complete and does not contain all of the information you should consider in making your investment decision. You should read the entire prospectus carefully before making an investment in our common stock. You should carefully consider, among other things, our consolidated financial statements and the related notes included elsewhere in this prospectus and the sections titled "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations." Except as otherwise indicated herein or as the context otherwise requires, references in this prospectus to "Poseida," "the company," "we," "us," and "our" refer to Poseida Therapeutics, Inc. and our consolidated subsidiaries.

POSEIDA THERAPEUTICS

Company Overview

We are a clinical-stage biopharmaceutical company focused on leveraging our proprietary next-generation, non-viral gene engineering technologies to create life-saving therapeutics for patients with high unmet medical need. We have built a wholly-owned pipeline of autologous and allogeneic chimeric antigen receptor T cell, or CAR-T, product candidates, initially focused on the treatment of hematological malignancies and solid tumors. Our proprietary gene engineering technologies are used to create product candidates predominantly comprised of a specific T cell subset, stem cell memory, or T_{SCM}, with the goal of addressing the limitations of other CAR-T therapies, including duration of response, the ability to treat solid tumors and tolerability concerns. We believe our management team's experience in cell and gene engineering will help us to rapidly develop and, if approved, commercialize potentially curative cell and gene therapies.

Our lead product candidate, P-BCMA-101, is an autologous CAR-T therapy being developed to treat patients with relapsed/refractory multiple myeloma. Preliminary results from our ongoing Phase 1 dose escalation clinical trial of P-BCMA-101 showed that as of November 21, 2018, of the 19 patients that were evaluable by International Myeloma Working Group, or IMWG, criteria, 14 had meaningful responses, with an objective response rate, or ORR, of 100% in three evaluable patients that had received the dose of P-BCMA-101 we expect to advance into Phase 2 clinical development. In addition, as of November 21, 2018, P-BCMA-101 continued to be well tolerated in the trial, with two mild and transient instances of cytokine release syndrome, or CRS, observed, and one patient with possible neurotoxicity, each of which occurred at doses below the planned Phase 2 dose. While we believe these preliminary results are encouraging, they are derived from a small number of patients and may not be predictive of future results or the durability of responses over time. We plan to begin a Phase 2 clinical trial for P-BCMA-101 in the first half of 2019, moving toward a potential biologics license application, or BLA, filing with the U.S. Food and Drug Administration, or FDA, by the end of 2020. We believe our planned Phase 2 clinical trial has the potential to be a registrational trial, which is a trial that could support a BLA filing. P-BCMA-101 has received a Regenerative Medicine Advanced Therapy, or RMAT, designation from the FDA, which is granted to regenerative medicine therapies that are intended to treat, modify, reverse or cure a serious or life-threatening disease or condition, and preliminary clinical evidence indicates that the product has the potential to address unmet medical needs for the disease or condition. Our second autologous product candidate, P-PSMA-101, is being developed to treat patients with castrate-resistant prostate cancer, or CRPC, a solid tumor indication. An additional autologous solid tumor candidate, P-MUC1C-101, is in late-stage preclinical development for multiple solid tumor indications. We plan to file an Investigational New Drug Application, or IND, with the FDA and begin a Phase 1 clinical trial for P-PSMA-101 in the second half of 2019 and for P-MUC1C-101 in 2020.

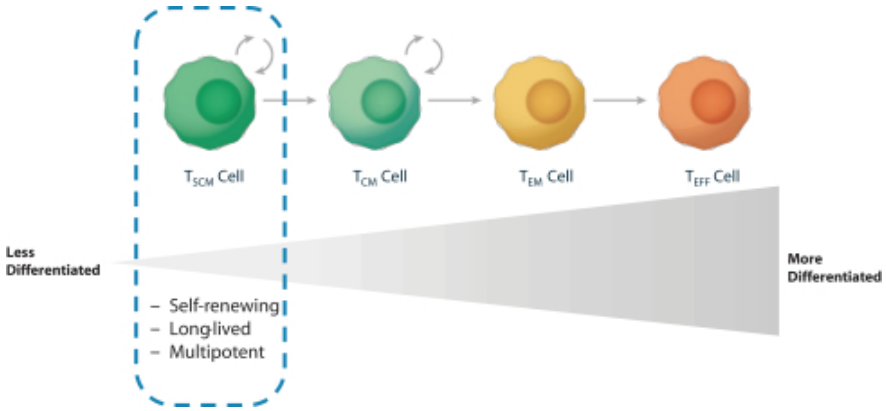
In addition to our autologous CAR-T programs, we are developing fully allogeneic product candidates derived from healthy donors allowing for the treatment of hundreds or thousands of patients from a single manufacturing run. We plan to file an IND and begin a Phase 1 clinical trial for P-BCMA-ALLO1, our lead allogeneic product candidate for the treatment of multiple myeloma, by late 2019 or early 2020. We plan to develop allogeneic versions of all of our hematological and solid tumor product candidates.

The advent of CAR-T therapies has revolutionized treatment of some hematological malignancies by demonstrating profound initial response rates in highly refractory patients and, in some cases, the ability to cure. Despite these response rates, there are several key limitations to early-generation CAR-T products, including duration of response, the ability to treat solid tumors and safety concerns, which we believe have thus far curtailed broader adoption. We believe these limitations are the result of early-generation CAR-T products being comprised predominately of short-lived, more differentiated T cells.

Not all T cells are created equally

Unlike other CAR-T approaches using lentivirus, our proprietary piggyBac DNA Modification System is able to create a product with a high percentage of early memory T cells, such as T_{SCM} cells. There is a one-way differentiation pathway from T_{SCM} cells to central memory T cells, or T_{CM}; then to effector memory T cells, or T_{EM}; and lastly, to effector T cells, or T_{EFF}. As T cells mature and differentiate, their core functions and capabilities change, impacting their potency and durability. Our approach is to utilize a high percentage of less differentiated T cells in our product candidates with the goal of increasing persistence and mitigating some of the key limitations of early-generation CAR-T products.

The following figure illustrates this directional T cell differentiation pathway, from T_{SCM} cell to T_{EFF} cell:



We believe our proprietary approach, combining an advanced manufacturing method with a sophisticated gene engineering platform, can address the primary challenges of early-generation CAR-T therapies in the following ways:

Duration and Activity

Durable responses. Our piggyBac manufacturing method results in product candidates with a high percentage of less differentiated early memory T cells, including the highly desirable T_{SCM} cells. T_{SCM} cells engraft in the patient's body and are long-lived, self-renewing and available to re-respond to future relapses, which we believe has the potential to result in a lifetime durable response.

Response in solid tumors. T_{SCM} cells have the unique ability to produce a potentially unlimited number of T_{EFF} cells, generating multiple waves of CAR-T responses with only a single administration of product. P-PSMA-101 resulted in the elimination of tumor cells to undetectable levels in 100% of animals in a preclinical model of prostate cancer. To our knowledge based on published literature, no other product candidate has shown complete solid tumor elimination in any animal in this same preclinical model.

Tolerability

More gradual killer. CAR-T products comprised of a high percentage of T_{SCM} cells are more gradual killers of tumor cells, which we believe can effectively dampen the rapid release of cytokines as seen in early-generation CAR-T products containing predominantly differentiated T cells, potentially resulting in a significantly higher therapeutic index, meaning a limited change in toxicity relative to increased dose.

Pure product candidates. We use our proprietary positive selection method to create product candidates that are comprised of essentially 100% CAR-positive cells, thereby minimizing one of the potential sources of CAR-T toxicity. Early-generation products do not utilize positive selection and typically contain a significant number of CAR-negative cells, which cannot kill cancer cells but may contribute to toxicity because they are artificially activated and expanded outside of the body.

Scalability

Allogeneic capability. We intend to use Cas-CLOVER, our proprietary site-specific gene editing platform, to develop allogeneic CAR-T product candidates, with the goal of further revolutionizing treatment by enabling administration of drug, derived from a single healthy donor and created in a single manufacturing run, to potentially hundreds or thousands of patients.

Versatility. Our proprietary non-viral piggyBac DNA Modification System allows us to insert multiple CARs and/or T cell receptors, or TCRs, as well as other genes into T cells simultaneously. This significantly increases the number of potential indications we can target and, therefore, the number of future product candidates in our pipeline. Additionally, the ability to insert positive selection and safety switch genes alongside CAR molecule genes has the potential to address the tolerability limitations that have precluded administration of early-generation CAR-T products in community hospitals and outpatient infusion sites.

Our CAR-T Pipeline

The following table summarizes our CAR-T oncology product candidate portfolio:

Candidate	Indication(s)	IND-Enabling	Phase 1	Phase 2	Phase 3*	Anticipated Next Milestone	Ownership
P-BCMA-101 *Autologous CAR-T*	Multiple Myeloma					Initiate Potential Registrational Trial 1H 2019	POSEIDA THERAPEUTICS
P-PSMA-101 *Autologous CAR-T*	Prostate Cancer					File IND 2H 2019	POSEIDA THERAPEUTICS
P-BCMA-ALLO1 *Allogeneic CAR-T*	Multiple Myeloma					File IND Late 2019 or Early 2020	POSEIDA THERAPEUTICS
P-MUC1C-101 *Autologous CAR-T*	Multiple Solid Tumors					File IND 2020	POSEIDA THERAPEUTICS

**Phase 3 may not be necessary if Phase 1/2 can serve as a registrational clinical trial. The FDA has not indicated whether Phase 3 clinical trials will be required for any of our product candidates.*

P-BCMA-101. Our lead product candidate is an autologous CAR-T therapy being developed to treat patients with relapsed/refractory multiple myeloma. P-BCMA-101 targets cells that express B cell maturation antigen, or BCMA, which is expressed on essentially all multiple myeloma cells. P-BCMA-101 is engineered with our non-viral piggyBac manufacturing method, resulting in a high percentage of T_{SCM} cells. Preliminary results from our ongoing Phase 1 clinical trial of P-BCMA-101 showed that as of November 21, 2018, of the 19 patients that were evaluable, 14 had meaningful responses, with an ORR of 100% in three evaluable patients that had

received the planned Phase 2 dose of P-BCMA-101. In addition, as of November 21, 2018, P-BCMA-101 continued to be well tolerated in the trial, with two mild and transient instances of CRS observed, and one patient with possible neurotoxicity, each of which occurred at doses below the planned Phase 2 dose. We continue to enroll patients in, and intend to use the data from, this trial to meet with the FDA in early 2019 to discuss our plan to initiate a Phase 2 clinical trial in the first half of 2019.

P-PSMA-101. P-PSMA-101 is an autologous CAR-T product candidate being developed with the goal of enabling treatment of patients with CRPC. P-PSMA-101 targets cells that express prostate-specific membrane antigen, or PSMA, which is expressed on most prostate cancer cells. P-PSMA-101 also utilizes our piggyBac manufacturing method, resulting in a high percentage of T_{SCM} cells. P-PSMA-101 has demonstrated elimination of tumor cells to undetectable levels in 100% of animals in a preclinical model of prostate cancer. To our knowledge based on published literature, no other product candidate has shown complete solid tumor elimination in any animal in this preclinical model.

P-PSMA-101 is currently undergoing IND-enabling activities and we anticipate an IND filing and initiation of a Phase 1 clinical trial in the second half of 2019.

P-BCMA-ALLO1. P-BCMA-ALLO1 is an allogeneic, or universal donor, CAR-T product candidate using well-characterized cells derived from a healthy donor as starting material and is being developed with the goal of enabling treatment of potentially hundreds or thousands of patients with multiple myeloma from a single manufacturing run. Doses could be cryopreserved and stored at treatment centers for future off-the-shelf use. P-BCMA-ALLO1 utilizes our proprietary Cas-CLOVER gene editing technology to reduce or eliminate alloreactivity. We anticipate an IND filing and initiation of a Phase 1 clinical trial for P-BCMA-ALLO1 by late 2019 or early 2020.

P-MUC1C-101. P-MUC1C-101 is an autologous CAR-T product candidate in late-stage preclinical development for multiple solid tumor indications. We believe P-MUC1C-101 has the potential to treat a wide range of solid tumors derived from epithelial cells, such as breast, colorectal, lung, ovarian, pancreatic and renal cancers, as well as other cancers expressing a cancer-specific form of the Mucin 1 protein, or MUC1C. P-MUC1C-101 has shown the elimination of tumor cells to undetectable levels in a preclinical model of breast cancer. We anticipate an IND filing and initiation of a Phase 1 clinical trial for P-MUC1C-101 in 2020.

Our Proprietary Technologies

We have developed a proprietary suite of technologies that we believe capitalizes on the benefits of T_{SCM} cells. Our primary differentiating technologies include:

- ***Ability to Increase Percentage of T_{SCM} Cells***. We believe our ability to generate CAR-T product candidates that are comprised of a high percentage of T_{SCM} cells will provide the potential to increase duration of response, possibly allow for re-response and lead to a more gradual production of T_{EFF} cells, thereby reducing toxicity and the requirement for an intensive care unit at treatment sites.
- ***Non-Viral Gene Insertion***. Our proprietary piggyBac DNA Modification System is highly efficient and has a significantly larger genetic cargo capacity compared to viral methods. As a result, our product candidates can contain transgenes large enough to include multiple CAR and/or TCR molecule genes, a selection gene, a safety switch gene, and potentially other cargo as needed for specific treatment applications, potentially making it more flexible.
- ***Gene Editing with Precise Specificity***. Our proprietary, highly precise Cas-CLOVER gene editing technology has shown little to no off-target activity in our preclinical studies and we believe it can efficiently edit resting T cells, allowing for the maintenance of T_{SCM} product composition in allogeneic product candidates.

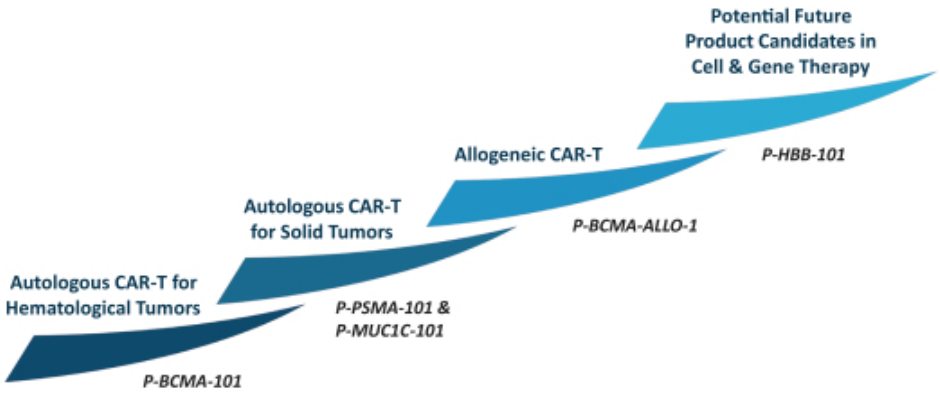
- ***Additional Proprietary Tools***:
  - *Positive selection.* We create product candidates utilizing a fully-human drug resistance gene that can be employed during manufacturing to create a purified product that is essentially 100% CAR-positive, minimizing one of the sources of CAR-T toxicity and thereby potentially enhancing the therapeutic index.
  - *iCasp9-based safety switch.* We have developed a proprietary safety switch comprised of fully-human genes that can be activated by administration of a small molecule, and thereafter, has the potential to rapidly eliminate some or all administered CAR-T cells in the patient.
  - *Booster molecules.* We have developed an approach that enables improved expansion of gene-edited allogeneic cells without affecting their desirable T_{SCM} characteristics.
  - *CAR binding libraries.* Instead of traditional single chain variable fragment, or scFv, binders, we utilize novel binder technologies which we believe are stable, do not result in tonic signaling and result in low to no immunogenicity.

Our Strategy

Our mission is to develop cell and gene therapies with the capacity to cure.

We intend to develop and commercialize novel cell and gene therapy products by using our broad gene engineering platform technologies to treat patients with high unmet medical need, initially focusing on CAR-T product candidates for oncology indications. We plan to pursue our mission through the following strategies:

- ***Rapidly develop and commercialize novel CAR-T therapies targeting hematological malignancies.*** We developed P-BCMA-101, a product candidate for patients with relapsed/refractory multiple myeloma, which is one of the more challenging hematological malignancies to treat, in order to showcase the advantages of our proprietary platform technologies. Over time, we plan to develop our product candidates in earlier lines of treatment and other hematological malignancies and will seek to commercialize in community hospital settings, and eventually in outpatient infusion sites.
- ***Leverage the strength and breadth of our platform technologies to develop CAR-T therapies in solid tumors.*** Our platform technology is designed to address the historical CAR-T limitations in treating solid tumors, which result from the lack of product persistence needed to have a clinical impact on these indications. We are advancing both P-PSMA-101 and P-MUC1C-101 as our initial product candidates for the treatment of solid tumors.
- ***Utilize our proprietary next-generation gene editing capabilities to develop allogeneic CAR-T products.*** Our lead allogeneic product candidate, P-BCMA-ALLO1, was designed to demonstrate our ability to develop a universal donor product candidate that has the same inherent properties and functions of our autologous anti-BCMA product candidate, P-BCMA-101. We plan to rapidly develop, and if approved, commercialize P-BCMA-ALLO1 and eventually develop an allogeneic version of all of our hematological and solid tumor product candidates.
- ***Fully exploit the versatility and scalability of our technology and capabilities beyond CAR-T for oncology.*** Our platform technologies have the potential to generate a broad array of future product candidates to treat a multitude of indications outside of oncology. For example, P-HBB-101, a non-CAR-T product candidate, is in early preclinical development for sickle cell disease.



Our Team

We have assembled an experienced and highly qualified management team with deep expertise in cell and gene therapy and a successful record of building and growing biotechnology companies. Our Chief Executive Officer, Eric Ostertag, Ph.D., M.D., was the first graduate from the Gene Therapy Program at the University of Pennsylvania and has over 20 years of experience in cell and gene engineering, founding multiple biotechnology companies, including Transposagen Biopharmaceuticals, Inc. Dr. Ostertag served as Transposagen's Chief Executive Officer for 13 years, developing next-generation genetic engineering technologies that were eventually spun out to create Poseida Therapeutics, Inc. in early 2015. We are also supported by a veteran group of life science investors including Longitude Capital, Vivo Capital, Boxer Capital and Malin Corporation.

Risks Associated with Our Business

Our ability to implement our business strategy is subject to numerous risks that you should be aware of before making an investment decision. These risks are described more fully in the section titled "Risk Factors," immediately following this prospectus summary. These risks include the following, among others:

- We are a clinical-stage biopharmaceutical company with a limited operating history. We have incurred net losses since our inception and anticipate that we will continue to incur significant losses for the foreseeable future. We have never generated any revenue from product sales and may never be profitable.
- Even if this offering is successful, we will need to obtain substantial additional funding to complete the development and any commercialization of our product candidates. If we are unable to raise this capital when needed, we may be forced to delay, reduce or eliminate our product development programs or other operations.
- Our product candidates are in the early stages of development. We only recently began clinical trials to test one of our product candidates in humans and, as a company, we have limited experience in this area. We may not be able to successfully complete clinical development of any of our product candidates.
- Our product candidates are based on novel technologies, which make it difficult to predict the timing, results and cost of product candidate development and likelihood of obtaining regulatory approval.
- Serious adverse events, undesirable side effects or other unexpected properties of our product candidates may be identified during development or after approval, which could lead to the discontinuation of our clinical development programs, refusal by regulatory authorities to approve our product candidates or, if discovered following marketing approval, revocation of marketing authorizations or limitations on the use of our product candidates.

- We rely on third parties to conduct our clinical trials, perform some of our research and preclinical studies and provide certain manufacturing services. If these third parties do not satisfactorily carry out their contractual duties or fail to meet expected deadlines, our development programs may be delayed or subject to increased costs.
- We are highly dependent on our key personnel, and if we are not successful in attracting and retaining highly qualified personnel, we may not be able to successfully implement our business strategy.
- We are currently party to several in-license agreements under which we acquired rights to use, develop, manufacture and/or commercialize certain of our gene engineering technologies and resulting product candidates. If we breach our obligations under these agreements, we may be required to pay damages, lose our rights to these technologies or both.
- We face substantial competition, which may result in others discovering, developing or commercializing products more quickly or marketing them more successfully than us.
- If we are unable to obtain and maintain sufficient intellectual property protection for our product candidates, or if the scope of the intellectual property protection is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours.
- If we are sued for infringing intellectual property rights of third parties, such litigation could be costly and time consuming and could prevent or delay us from developing or commercializing our product candidates.

Corporate Information

We were incorporated in Delaware in December 2014. Our principal executive offices are located at 4242 Campus Point Court, Suite 700, San Diego, CA 92121, and our telephone number is 858-779-3100. Our website address is www.poseida.com. The information contained in, or that can be accessed through, our website is not part of this prospectus.

Poseida Therapeutics, Inc. was created through a corporate reorganization of Transposagen Biopharmaceuticals, Inc., or Transposagen, with the purpose of pursuing Transposagen's gene engineering tools for developing therapeutic products. Transposagen is based in Lexington, Kentucky and has been a leader in developing gene engineering technologies since 2003. Our Chief Executive Officer, Eric Ostertag, M.D., Ph.D., was the founder and Chief Executive Officer of Transposagen.

Implications of Being an Emerging Growth Company

We qualify as an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. An emerging growth company may take advantage of relief from certain reporting requirements and other burdens that are otherwise applicable generally to public companies. These provisions include:

- reduced obligations with respect to financial data, including presenting only two years of audited financial statements in addition to any required unaudited interim financial statements and only two years of selected financial data;
- an exemption from compliance with the auditor attestation requirements of Section 404 of the Sarbanes Oxley Act of 2002, or the Sarbanes Oxley Act;
- 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 about our executive compensation arrangements in our periodic reports, proxy statements and registration statements; and
- exemptions from the requirements of holding non-binding advisory votes on executive compensation or golden parachute arrangements.

In addition, as an "emerging growth company" the JOBS Act allows us to delay adoption of new or revised accounting pronouncements applicable to public companies until such pronouncements are made applicable to private companies, unless we later irrevocably elect not to avail ourselves of this exemption. We have elected to use this extended transition period under the JOBS Act; however, we may choose to early adopt new or revised accounting pronouncements, if permitted under such pronouncements.

We may take advantage of these reporting exemptions until we are no longer an emerging growth company. We will remain an emerging growth company until the earlier of (1) the last day of the fiscal year (a) following the fifth anniversary of the completion of this offering, (b) in which we have total annual gross revenue of at least $1.07 billion or (c) in which we are deemed to be a large accelerated filer, which means the market value of our common stock that is held by non-affiliates exceeds $700 million as of the prior June 30th and (2) the date on which we have issued more than $1.0 billion in non-convertible debt during the prior three-year period.

Because we have taken advantage of certain reduced reporting requirements, the information contained herein may be different from the information you receive from other public companies in which you hold stock.

The Offering

Common stock offered by us	shares
Option to purchase additional shares	shares
Common stock to be outstanding immediately following this offering	shares (or shares if the underwriters exercise in full their option to purchase additional shares)
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $ million, or $ million if the underwriters exercise their option to purchase additional shares in full, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, assuming an initial public offering price of $ per share, which is the midpoint of the estimated price range set forth on the cover page of this prospectus. We intend to use the net proceeds from this offering to fund the preclinical and clinical development of our product candidates, research and development of new discovery programs for both the CAR-T and gene therapy platforms and for working capital and general corporate purposes. See the section titled "Use of Proceeds."
Risk factors	You should read the section titled "Risk Factors" for a discussion of factors to consider carefully before deciding to invest in shares of our common stock.
Proposed Nasdaq Global Select Market symbol	"PSTX"

The number of shares of common stock to be outstanding after this offering is based on shares of common stock outstanding as of September 30, 2018, and excludes the following:

- 2,468,240 shares of common stock issuable upon the exercise of options outstanding as of September 30, 2018 with a weighted-average exercise price of $2.61 per share;
- shares of our common stock reserved for issuance under our 2018 Equity Incentive Plan, or the 2018 Plan, which will become effective in connection with this offering, as well as any automatic annual increases in the number of shares of common stock reserved for future issuance under the 2018 Plan, as more fully described in the section titled "Equity Compensation—Equity Plans;"
- shares of our common stock reserved for future issuance under our 2018 Employee Stock Purchase Plan, or 2018 ESPP, which will become effective in connection with this offering, as well as any automatic annual increases in the number of shares of common stock reserved for future issuance under the 2018 ESPP, as more fully described in the section titled "Equity Compensation—Equity Plans;"
- 116,618 shares of common stock issuable upon the exercise of outstanding warrants as of September 30, 2018, with an exercise price of $3.43 per share;
- 17,212 shares of common stock issuable upon the exercise of an outstanding warrant as of September 30, 2018, with an exercise price of $5.81 per share; and

- up to 1,893,287 shares of common stock potentially issuable to the former stockholders of Vindico NanoBioTechnology, Inc. if a specified preclinical development milestone is achieved prior to July 31, 2019.

Unless otherwise indicated, all information in this prospectus assumes:

- the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 18,200,011 shares of common stock immediately prior to and in connection with the completion of this offering;
- the filing and effectiveness of our amended and restated certificate of incorporation and the adoption of our amended and restated bylaws, each of which will occur immediately prior to the completion of this offering;
- no exercise of the underwriters' option to purchase additional shares; and
- no exercise or cancellation of outstanding options or warrants subsequent to September 30, 2018; however, any options awards issued under our 2015 Equity Incentive Plan that expire, terminate or are forfeited will become available for issuance under our 2018 Equity Incentive Plan.

Summary Consolidated Financial Data

The following tables set forth a summary of our historical consolidated financial data as of, and for the periods ended on, the dates indicated. We have derived the summary consolidated statements of operations data for the years ended December 31, 2016 and 2017 and the summary consolidated balance sheet data as of December 31, 2017 from our audited consolidated financial statements appearing elsewhere in this prospectus. We have derived the summary consolidated statements of operations data for the nine months ended September 30, 2017 and 2018 and the summary consolidated balance sheet data as of September 30, 2018 from our unaudited condensed consolidated financial statements included elsewhere in this prospectus. The unaudited condensed consolidated financial statements have been prepared on a basis consistent with our audited consolidated financial statements included in this prospectus and, in the opinion of our management, reflect all adjustments, consisting only of normal recurring adjustments, necessary to fairly state our financial position as of September 30, 2018 and results of operations for the nine months ended September 30, 2017 and 2018. You should read the following summary consolidated financial data together with our consolidated financial statements and the related notes included elsewhere in this prospectus and the sections titled "Selected Consolidated Financial Data" and "Management's Discussion and Analysis of Financial Condition and Results of Operations."

	Year Ended December 31,		Nine Months Ended September 30,	
	2016	2017	2017	2018
			(unaudited)	
Consolidated Statements of Operations Data:				
(In thousands, except share and per share amounts)				
Revenue	$ 9,768	$ 2,985	$ 2,985	$ —
Operating expenses:				
Research and development	9,264	19,099	14,745	21,130
General and administrative	5,353	5,479	3,884	7,277
Increase (decrease) in contingent consideration	—	(1,925)	(768)	1,462
Total operating expenses	14,617	22,653	17,861	29,869
Loss from operations	(4,849)	(19,668)	(14,876)	(29,869)
Other income (expense):				
Interest expense	—	(558)	(228)	(1,167)
Other income (expense), net	109	37	45	(686)
Net loss before income tax	(4,740)	(20,189)	(15,059)	(31,722)
Income tax benefit	165	527	188	208
Net loss and comprehensive loss	$ (4,575)	$ (19,662)	$ (14,871)	$ (31,514)
Net loss per share attributable to common stockholders, basic and diluted	$ (0.35)	$ (1.38)	$ (1.06)	$ (2.08)
Weighted-average common shares outstanding, basic and diluted	12,909,518	14,198,666	14,044,726	15,158,963
Pro forma net loss per share attributable to common stockholders, basic and diluted(1)		$ (0.78)		$ (0.96)
Pro forma weighted average common shares outstanding, basic and diluted(1)		25,348,462		31,859,098

(1) See Notes 2 and 16 to our consolidated financial statements included elsewhere in this prospectus for an explanation of the method used to calculate the historical and pro forma net loss per share of common stock, basic and diluted, and the number of shares used in the computation of the per share amounts.

	September 30, 2018		
	Actual	Pro Forma(2) (unaudited)	Pro Forma As Adjusted(3)
Consolidated Balance Sheet Data:			
(In thousands)			
Cash and cash equivalents	$ 38,534	$	$
Working capital(1)	30,640		
Total assets	47,712		
Term debt, net of discount	19,023		
Preferred warrant liability	1,336		
Convertible preferred stock	72,460		
Total stockholders' equity (deficit)	(64,215)		

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

(2) Gives effect to (i) the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 18,200,011 shares of our common stock and the resulting reclassification of the carrying value of the preferred stock to additional paid-in capital, (ii) the automatic conversion of all outstanding warrants to purchase shares of preferred stock into warrants to purchase up to an aggregate of 116,618 shares of our common stock and the resulting reclassification of the carrying value of the warrant liability to additional paid-in capital, and (iii) the filing and effectiveness of our amended and restated certificate of incorporation, each of which will occur immediately prior to the completion of this offering.

(3) Gives effect to (i) the pro forma adjustments set forth in footnote (2) above and (ii) our issuance and sale of shares of our common stock in this offering at the assumed initial public offering price of $ per share, which is the midpoint of the estimated price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share would increase (decrease) the pro forma as adjusted amount of each of cash and cash equivalents, working capital, total assets and total stockholders' equity by approximately $, assuming the number of shares offered by us, as set forth on the cover page of this prospectus remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. Similarly, each increase (decrease) of 1.0 million shares in the number of shares offered by us, as set forth on the cover page of this prospectus, at the assumed initial public offering price of $ per share would increase (decrease) the pro forma as adjusted amounts of each of cash and cash equivalents, working capital, total assets and total stockholders' equity by approximately $, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. The pro forma as adjusted information discussed above is illustrative only and will be adjusted based on the actual initial public offering price and other terms of this offering determined at pricing.

RISK FACTORS

Investing in our common stock is speculative and involves a high degree of risk. 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 included elsewhere in this prospectus and in the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations" before deciding whether to invest in our common stock. If any of the following risks occur, our business, financial condition, results of operations and future growth prospects could be materially and adversely affected. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment. This prospectus also contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in the forward-looking statements as a result of a number of factors, including the risks described below. See the section titled "Special Note Regarding Forward-Looking Statements."

Risks Related to Our Limited Operating History, Financial Position and Capital Requirements

We are a clinical-stage biopharmaceutical company with a limited operating history. We have incurred net losses since our inception and anticipate that we will continue to incur significant losses for the foreseeable future. We have never generated any revenue from product sales and may never be profitable.

We are a clinical-stage biopharmaceutical company with a very limited operating history that may make it difficult to evaluate the success of our business to date and to assess our future viability. Our operations to date have been limited to organizing and staffing our company, business planning, raising capital, establishing and protecting our intellectual property portfolio, developing our gene engineering technologies, identifying potential product candidates and undertaking research and development and manufacturing activities, including preclinical studies and clinical trials of our product candidates. All of our product candidates are in early development, and none have been approved for commercial sale. We have never generated any revenue from product sales and have incurred net losses each year since we commenced operations. For the years ended December 31, 2016 and 2017 and the nine months ended September 30, 2018, our net losses were $4.6 million, $19.7 million and $31.5 million, respectively. As of September 30, 2018, we had an accumulated deficit of $52.8 million. We expect that it will be several years, if ever, before we have a product candidate ready for regulatory approval and commercialization. We expect to incur increasing levels of operating losses over the next several years and for the foreseeable future as we advance our product candidates through clinical development. Our prior losses, combined with expected future losses, have had and will continue to have an adverse effect on our stockholders' deficit and working capital.

To become and remain profitable, we must develop and eventually commercialize a product with significant market potential. This will require us to be successful in a range of challenging activities, including completing preclinical studies and clinical trials of our product candidates, obtaining marketing approval for these product candidates, manufacturing, marketing and selling those products for which we may obtain marketing approval and satisfying any post-marketing requirements. We may never succeed in these activities and, even if we succeed in commercializing one or more of our product candidates, we may never generate revenue that is significant or large enough to achieve profitability. In addition, as a young business, we may encounter unforeseen expenses, difficulties, complications, delays and other known and unknown challenges. If we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis and we will continue to incur substantial research and development and other expenditures to develop and market additional product candidates. Our failure to become and remain profitable would decrease the value of the company and could impair our ability to raise capital, maintain our research and development efforts, expand our business or continue our operations. A decline in the value of our company could also cause you to lose all or part of your investment.

Our recurring losses and negative cash flows from operations raise substantial doubt about our ability to continue as a going concern. As a result, the audit report of our independent registered public accounting firm

contained in our consolidated financial statements for the year ended December 31, 2017 includes an explanatory paragraph that describes conditions that raise substantial doubt about our ability to continue as a going concern. We are seeking to complete an initial public offering, or IPO, of our common stock. In the event we do not complete an IPO, we expect to seek additional funding through private equity financings, debt financings, collaborations or grant funding. However, if we are unable to obtain adequate financing, we could be forced to delay, reduce or eliminate our research and development programs or other operations. If any of these events occur, our ability to achieve the development and commercialization goals would be adversely affected. We do not have any additional financing in place and there can be no assurance that we can obtain financing, if at all, on terms acceptable to us.

Even if this offering is successful, we will need to obtain substantial additional funding to complete the development and any commercialization of our product candidates. If we are unable to raise this capital when needed, we may be forced to delay, reduce or eliminate our product development programs or other operations.

Since our inception, we have used substantial amounts of cash to fund our operations and expect our expenses to increase substantially during the next few years. The development of biopharmaceutical product candidates is capital intensive. As our product candidates enter and advance through preclinical studies and clinical trials, we will need substantial additional funds to expand our clinical, regulatory, quality and manufacturing capabilities. In addition, if we obtain marketing approval for any of our product candidates, we expect to incur significant commercialization expenses related to marketing, sales, manufacturing and distribution. Furthermore, upon the completion of this offering, we expect to incur additional costs associated with operating as a public company.

As of September 30, 2018, we had $38.5 million in cash and cash equivalents. With the expected net proceeds from this offering, we believe that our cash and cash equivalents will be sufficient to fund our operating expenses and capital expenditure requirements through at least the next months from the date of this offering. However, the expected net proceeds from this offering will not be sufficient to fund any of our product candidates through regulatory approval, and we will need to raise substantial additional capital to complete the development and commercialization of our product candidates.

We have based these estimates on assumptions that may prove to be incorrect or require adjustment as a result of business decisions, and we could utilize our available capital resources sooner than we currently expect. Our future capital requirements will depend on many factors, including:

- scope, progress and results of our ongoing and planned preclinical studies and clinical trials for our product candidates;
- unanticipated serious safety concerns related to the use of our product candidates;
- timing of licensing payments we may be required to make based on the development of our product candidates;
- the number of and development requirements of other product candidates that we may pursue;
- the timing and outcome of regulatory review of our product candidates;
- changes in laws or regulations applicable to our product candidates, including but not limited to clinical trial requirements for approval;
- our decisions to initiate additional clinical trials, not to initiate any clinical trial or to terminate an existing clinical trial;
- the cost of obtaining raw materials and drug product for clinical trials and commercial supply;
- whether we decide to establish a pilot manufacturing facility for supply of product candidates for clinical trials; and
- additions or departures of key scientific or management personnel.

Because we do not expect to generate revenue from product sales for many years, if at all, we will need to obtain substantial additional funding in connection with our continuing operations and expected increases in expenses. Until such time as we can generate significant revenue from sales of our product candidates, if ever, we expect to finance our cash needs through equity offerings, debt financings or other capital sources, including potentially grants, collaborations, licenses or other similar arrangements. In addition, we may seek additional capital due to favorable market conditions or strategic considerations, even if we believe we have sufficient funds for our current or future operating plans. If we are unable to raise capital when needed or on attractive terms, we would be forced to delay, reduce or eliminate our research and development programs or future commercialization efforts.

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 revenue, we expect to finance our operations through equity offerings, debt financings or other capital sources, including potentially grants, collaborations, licenses or other similar 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. Additional debt financing, if available, may involve agreements that include covenants further limiting or restricting our ability to take specific actions beyond those contained in our existing loan agreement, such as further limitations on our ability to incur additional debt, make capital expenditures or declare dividends.

If we raise funds through collaborations or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, 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 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 product candidates that we would otherwise prefer to develop and market ourselves.

The terms of our loan agreement place restrictions on our operating and financial flexibility. If we raise additional capital through debt financing, the terms of any new debt could further restrict our ability to operate our business.

We have an outstanding term loan in the principal amount of $20.0 million under our loan and security agreement, as amended, with Oxford Finance LLC, or Oxford. The loan is secured by a lien covering substantially all of our personal property, rights and assets, excluding intellectual property. The loan agreement contains customary affirmative and negative covenants and events of default applicable to us and any subsidiaries. The affirmative covenants include, among others, covenants requiring us (and us to cause our subsidiaries, if any) to maintain governmental approvals, deliver certain financial reports, maintain insurance coverage, keep inventory, if any, in good and marketable condition and protect material intellectual property. The negative covenants include, among others, restrictions on us and our subsidiaries transferring collateral, incurring additional indebtedness, engaging in mergers or acquisitions, paying cash dividends or making other distributions, making investments, creating liens, selling assets and making any payment on subordinated debt, in each case subject to certain exceptions. The restrictive covenants of the loan agreement could cause us to be unable to pursue business opportunities that we or our stockholders may consider beneficial. In addition, Oxford could declare a default upon the occurrence of any event that it interprets as a material adverse change as defined under the loan agreement. If we default under the loan agreement, Oxford may accelerate all of our repayment obligations and take control of our pledged assets, potentially requiring us to renegotiate our agreement on terms less favorable to us or to immediately cease operations. Further, if we are liquidated, Oxford’s right to repayment would be senior to the rights of the holders of our common stock to receive any proceeds from the liquidation. Any declaration by Oxford of an event of default could significantly harm our business and prospects and could

cause the price of our common stock to decline. If we raise any additional debt financing, the terms of such additional debt could further restrict our operating and financial flexibility.

Risks Related to the Discovery, Development and Regulatory Approval of Our Product Candidates

Our product candidates are in the early stages of development. We only recently began clinical trials to test one of our product candidates in humans and, as a company, we have limited experience in this area.

We are early in our development efforts and most of our operations to date have been limited to developing our gene-engineering technologies, establishing manufacturing capabilities and conducting drug discovery and preclinical studies. Our lead product candidate, P-BCMA-101, entered a Phase 1 clinical trial in December 2017 which was the first time one of our product candidates had been tested in humans. As a result, we have limited infrastructure, experience conducting clinical trials as a company and regulatory interactions, and cannot be certain that our clinical trials will be completed on time, that our planned clinical trials will be initiated on time, if at all, that our planned development programs would be acceptable to the FDA or other comparable foreign regulatory authorities, or that, if approval is obtained, such product candidates can be successfully commercialized.

Because of the early stage of development of our products candidates, our ability to eventually generate significant revenues from product sales will depend on a number of factors, including:

- successful completion of preclinical studies;
- submission of our Investigational New Drug applications, or INDs, or other regulatory applications for our planned clinical trials or future clinical trials and authorizations from regulators to initiate clinical studies;
- successful enrollment in, and completion of, clinical trials and achieving positive results from the trials;
- receipt of marketing approvals from applicable regulatory authorities;
- establishing manufacturing capabilities or arrangements with third-party manufacturers for clinical supply and, if and when approved, for commercial supply;
- establishing sales, marketing and distribution capabilities and launching commercial sales of our products, if and when approved, whether alone or in combination with others;
- acceptance of our products, if and when approved, by patients, the medical community and third-party payors;
- effectively competing with other therapies;
- developing and implementing marketing and reimbursement strategies;
- obtaining and maintaining third-party coverage and adequate reimbursement;
- obtaining and maintaining patent, trade secret and other intellectual property protection and regulatory exclusivity for our product candidates;
- the ability to obtain clearance or approval of companion diagnostic tests, if required, on a timely basis, or at all; and
- maintaining a continued acceptable safety profile of any product following approval, if any.

If we do not achieve one or more of these requirements in a timely manner, we could experience significant delays or an inability to successfully commercialize our product candidates, which would materially harm our business.

Clinical development is a lengthy, expensive and uncertain process. The results of preclinical studies and early clinical trials are not always predictive of future results. Any product candidate that we advance into clinical trials may not achieve favorable results in later clinical trials, if any, or receive marketing approval.

The research and development of drugs and biological products is extremely risky. Only a small percentage of product candidates that enter the development process ever receive marketing approval. Before obtaining marketing approval from regulatory authorities for the sale of our product candidates, we must conduct extensive clinical trials to demonstrate the safety and efficacy of the product candidates in humans. Clinical testing is expensive, can take many years to complete and its outcome is uncertain.

The results of preclinical studies and early clinical trials of our product candidates and other products, even those with the same or similar mechanisms of action, may not be predictive of the results of later-stage clinical trials. In particular, it is not uncommon for product candidates to exhibit unforeseen safety or efficacy issues when tested in humans despite promising results in preclinical animal models. While we have conducted preclinical studies and have Phase 1 clinical trial results for P-BCMA-101 at certain dose levels, we do not know how P-BCMA-101 will perform at higher dose levels, whether any initial tumor responses observed to date will be durable, whether adverse events will arise over time or how P-BCMA-101 will perform in future clinical trials. Other than P-BCMA-101, none of our product candidates has ever been tested in humans. Future results of preclinical and clinical testing of our product candidates are also less certain due to the novel and relatively untested nature of our approach to CAR-T therapy and gene engineering technologies and resulting product candidates. In general, clinical trial failure may result from a multitude of factors including flaws in study design, dose selection, patient enrollment criteria and failure to demonstrate favorable safety or efficacy traits. As such, failure in clinical trials can occur at any stage of testing. A number of companies in the biopharmaceutical industry have suffered setbacks in the advancement of clinical trials due to lack of efficacy or adverse safety profiles, notwithstanding promising results in earlier trials.

If the results of our clinical trials are inconclusive or if there are safety concerns or adverse events associated with our product candidates, we may:

- incur unplanned costs;
- be delayed in or prevented from obtaining marketing approval for our product candidates;
- obtain approval for indications or patient populations that are not as broad as intended or desired;
- obtain approval with labeling that includes significant use or distribution restrictions or safety warnings including boxed warnings;
- be subject to changes in the way the product is administered;
- be required to perform additional clinical trials to support approval or be subject to additional post-marketing testing requirements;
- have regulatory authorities withdraw their approval of the product or impose restrictions on its distribution in the form of a modified Risk Evaluation and Mitigation Strategy, or REMS;
- be subject to the addition of labeling statements, such as warnings or contraindications;
- be sued; or
- experience damage to our reputation.

Treatment with our product candidates involves chemotherapy and myeloablative treatments, which can cause side effects or adverse events that are unrelated to our product candidate but may still impact the success of our clinical trials. Additionally, our product candidates could potentially cause other adverse events. The inclusion of critically ill patients in our clinical trials may result in deaths or other adverse medical events due to other therapies or medications that such patients may be using. As described above, any of these events could

prevent us from obtaining regulatory approval or achieving or maintaining market acceptance of our product candidates and impair our ability to commercialize our products. Because all of our product candidates are derived from our gene engineering technologies, a clinical failure of one of our product candidates may also increase the actual or perceived likelihood that our other product candidates will experience similar failures.

We may encounter substantial delays in our clinical trials.

We cannot guarantee that any clinical trials will be conducted as planned or completed on schedule, if at all. For example, we cannot begin our planned Phase 1 clinical trials for P-PSMA-101, P-BCMA-ALLO1 or P-MUC1C-101 until we complete certain preclinical development and submit and receive approvals of INDs. Other events that may prevent successful or timely completion of clinical development include:

- delays in reaching a consensus with regulatory agencies on trial design;
- delays in reaching agreement on acceptable terms with prospective clinical 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;
- delays in obtaining required institutional review board, or IRB, approval at each clinical trial site;
- delays in recruiting suitable patients to participate in our clinical trials;
- imposition of a clinical hold by regulatory agencies, after an inspection of our clinical trial operations or study sites;
- failure by our CROs, other third parties or us to adhere to the trial protocol or the FDA's good clinical practices, or GCPs, or applicable regulatory guidelines in other countries;
- third-party contractors becoming debarred or suspended or otherwise penalized by the FDA or other comparable foreign regulatory authorities for violations of applicable regulatory requirements;
- delays in the testing, validation, manufacturing and delivery of our product candidates to the treatment sites, including due to a facility manufacturing any of our product candidates or any of their components being ordered by the FDA or comparable foreign regulatory authorities to temporarily or permanently shut down due to violations of current good manufacturing practices, or cGMPs, regulations or other applicable requirements, or infections or cross-contaminations of product candidates in the manufacturing process;
- delays in having patients complete participation in a study or return for post-treatment follow-up;
- clinical trial sites or patients dropping out of a study;
- discovering that product candidates have unforeseen safety issues, undesirable side effects or other unexpected characteristics;
- to the extent that we conduct clinical trials in foreign countries, the failure of enrolled patients in foreign countries to adhere to clinical protocol as a result of differences in healthcare services or cultural customs, managing additional administrative burdens associated with foreign regulatory schemes, as well as political and economic risks relevant to such foreign countries;
- receiving untimely or unfavorable feedback from applicable regulatory authorities regarding the trial or requests from regulatory authorities to modify the design of a trial;
- 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 regulatory authorities due to a number of factors, including those described above;
- lack of adequate funding; or
- changes in regulatory requirements and guidance that require amending or submitting new clinical protocols.

Any inability to successfully complete preclinical and clinical development could result in additional costs to us or impair our ability to raise capital, generate revenues from product sales and enter into or maintain collaboration arrangements. In addition, if we make manufacturing changes to our product candidates, we may need to conduct additional studies to bridge our modified product candidates to earlier versions. Clinical trial delays could also shorten any periods during which we may have the exclusive right to commercialize our product candidates or allow our competitors to bring products to market before we do, which could impair our ability to successfully commercialize our product candidates and may harm our business and results of operations.

Our product candidates are based on novel technologies, which make it difficult to predict the timing, results and cost of product candidate development and likelihood of obtaining regulatory approval.

We have concentrated our research and development efforts on product candidates using our gene engineering technologies, and our future success depends on the successful development of this approach. CAR-T and gene editing in general are newly-emerging fields and our approaches in particular have not been extensively tested over any significant period of time. In particular, while we believe that CAR-T products with higher percentages of T_{scm} cells may be capable of overcoming certain challenges faced by early-generation CAR-T products, we cannot be certain that increasing the percentage of these cells will result in the intended benefits or will not result in unforeseen negative consequences over time, including due to the potential long-term persistence of the modified cells in the body. We may also experience delays in developing a sustainable, reproducible and scalable manufacturing process or transferring that process to commercial partners, which may prevent us from completing our clinical trials or commercializing any products on a timely or profitable basis, if at all.

In addition, the clinical trial requirements of the FDA, the European Medicines Agency, or EMA, and other regulatory agencies and the criteria these regulators use to determine 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 novel product candidates such as ours can be more expensive and take longer than for other, better known or extensively studied pharmaceutical or other product candidates. While CAR-T and gene therapy products have made progress in recent years, only a small number of products have been approved in the United States or other markets, which makes it difficult to determine how long it will take or how much it will cost to obtain regulatory approvals for our product candidates.

In addition, the gene-editing industry is rapidly developing, and our competitors may introduce new technologies that render our technologies obsolete or less attractive. New technology could emerge at any point in the development cycle of our product candidates. As competitors use or develop alternative technologies, any failures of such technologies could adversely impact our program. For example, recent studies suggested that gene editing using the CRISPR-Cas9 method may increase the risk that the edited cells themselves become cancerous. Regardless of our belief that our non-viral Cas-CLOVER approach to gene editing may avoid some of the issues identified in these studies, it is possible that our approach will be associated with similar risks or that issues encountered with other gene editing techniques will create a negative perception of or increase scrutiny for our technologies and product candidates.

Regulatory requirements governing products created with gene 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 and other products created with gene editing technology. For example, under the National Institutes of Health, or NIH, Guidelines for Research Involving Recombinant DNA Molecules, or 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 product candidates through the NIH for 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 conduct clinical trials of our product candidates, or a central IRB if appropriate, would need to review and approve the proposed clinical trial.

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 gene editing, may cause the FDA and other regulatory bodies to revise the requirements for approval of any product candidates we may develop or limit the use of products utilizing gene 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.

We are also developing allogeneic CAR-T product candidates that are engineered from healthy donor T cells and are intended for use in any patient with certain cancers. Allogeneic versions of CAR-T product candidates is an unproven field of development and is subject to particular risks that are difficult to quantify, including understanding and addressing variability in the quality of a donor's T cells and the patient's potential immune reaction to the foreign donor cells, which could ultimately affect safety, efficacy and our ability to produce product in a reliable and consistent manner.

Serious adverse events, undesirable side effects or other unexpected properties of our product candidates may be identified during development or after approval, which could lead to the discontinuation of our clinical development programs, refusal by regulatory authorities to approve our product candidates or, if discovered following marketing approval, revocation of marketing authorizations or limitations on the use of our product candidates thereby limiting the commercial potential of such product candidate.

To date, we have only tested P-BCMA-101 in a limited number of patients with cancer and these clinical trial participants have only been observed for a limited period of time after dosing. As we continue developing our product candidates and initiate clinical trials of our additional product candidates, serious adverse events, undesirable side effects, relapse of disease or unexpected characteristics may emerge causing us to abandon these product candidates or limit their development to more narrow uses or subpopulations in which the serious adverse events or undesirable side effects or other characteristics are less prevalent, less severe or more acceptable from a risk-benefit perspective or in which efficacy is more pronounced or durable. For example, a significant risk observed in prior CAR-T product clinical trials, which in some instances resulted in patient deaths, is the development of cytokine release syndrome, or CRS. While they were mild in nature, at least two instances of CRS have been reported in our on-going Phase 1 clinical trial of P-BCMA-101. Should we observe additional or more severe cases of CRS in our clinical trials or if we identify other undesirable side effects or other unexpected findings depending on their severity, our trials could be delayed or even stopped and our development programs may be halted entirely.

Even if our product candidates initially show promise in early clinical trials, the side effects of biological products are frequently only detectable after they are tested in larger, longer and more extensive clinical trials or, in some cases, after they are made available to patients on a commercial scale after approval. Sometimes, it can be difficult to determine if the serious adverse or unexpected side effects were caused by the product candidate or another factor, especially in oncology subjects who may suffer from other medical conditions and be taking other medications. If serious adverse or unexpected side effects are identified during development or after approval and are determined to be attributed to our product candidate, we may be required to develop 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. Product-related side effects could also result in potential product liability claims. Any of these occurrences may harm our business, financial condition and prospects significantly.

In addition, if one or more of our product candidates receives marketing approval, and we or others later identify undesirable side effects caused by such products, a number of potentially significant negative consequences could result, including:

- 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 clinical trials;
- the product may become less competitive;
- we may decide to remove the product from the marketplace; and
- we may be subject to fines, injunctions or the imposition of civil or criminal penalties.

In the future, certain of our product candidates may require companion diagnostics in certain indications. Failure to successfully develop, validate and obtain regulatory clearance or approval for such tests could harm our product development strategy or prevent us from realizing the full commercial potential of our product candidates.

In the future certain of our product candidates may require companion diagnostics to identify appropriate patients for those product candidates in certain indications. Companion diagnostics are subject to regulation by the FDA and comparable foreign regulatory authorities as a medical device and may require separate regulatory authorization prior to commercialization. We may rely on third parties for the design, development, testing and manufacturing of these companion diagnostics, the application for and receipt of any required regulatory authorization, and the commercial supply of these companion diagnostics. If these parties are unable to successfully develop companion diagnostics for these product candidates, or experience delays in doing so, the development of our product candidates may be adversely affected, and we may not be able to obtain marketing authorization for these product candidates. Furthermore, our ability to market and sell, as well as the commercial success, of any of our product candidates that require a companion diagnostic will be tied to, and dependent upon, the receipt of required regulatory authorization and the continued ability of such third parties to make the companion diagnostic commercially available on reasonable terms in the relevant geographies. Any failure to develop, validate, obtain and maintain marketing authorization for or manufacture a companion diagnostic such companion diagnostic will harm our business, results of operations and financial condition.

Our product candidates must meet extensive regulatory requirements before they can be commercialized and any regulatory approval may contain limitations or conditions that require substantial additional development expenses or limit our ability to successfully commercialize the product.

The clinical development, manufacturing, labeling, storage, record-keeping, advertising, promotion, import, export, marketing and distribution of our product candidates are subject to extensive regulation by the FDA in the United States and by comparable foreign regulatory authorities in foreign markets. In the United States, we are

not permitted to market our product candidates until we receive regulatory approval from the FDA. The process of obtaining regulatory approval is expensive, often takes many years following the commencement of clinical trials and can vary substantially based upon the type, complexity and novelty of the product candidates involved, as well as the target indications and patient population. Despite the time and expense invested in clinical development of product candidates, regulatory approval is never guaranteed. In addition, while P-BCMA-101 has received a Regenerative Medicine Advanced Therapy, or RMAT, designation, the designation does not change the standards for product approval, and there is no assurance that such designation or eligibility will result in expedited review or approval or that the approved indication will not be narrower than the indication covered by the RMAT designation. 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.

Prior to obtaining approval to commercialize a product candidate in the United States or abroad, we or our potential future collaborators must demonstrate with substantial evidence from adequate and well-controlled clinical trials, and to the satisfaction of the FDA or comparable foreign regulatory authorities, that such product candidates are safe and effective for their intended uses. Even if we believe the preclinical or clinical data for our product candidates are promising, such data may not be sufficient to support approval by the FDA and comparable foreign regulatory authorities. In particular, because we are seeking to identify and develop product candidates using new technologies, there is heightened risk that the FDA or other regulatory authorities may impose additional requirements prior to granting marketing approval, including enhanced safety studies or monitoring. Furthermore, as more product candidates within a particular class of products proceed through clinical development to regulatory review and approval, the amount and type of clinical data that may be required by regulatory authorities may increase or change.

The FDA or comparable foreign regulatory authorities can delay, limit or deny approval of a product candidate for many reasons, including:

- such authorities may disagree with the design or implementation of our clinical trials;
- negative or ambiguous results from our clinical trials or results may not meet the level of statistical significance required by the FDA or comparable foreign regulatory agencies for approval;
- serious and unexpected product-related side effects may be experienced by participants in our clinical trials or by individuals using biological products similar to our product candidates;
- the population studied in the clinical trial may not be sufficiently broad or representative to assure safety in the full population for which we seek approval;
- such authorities may not accept clinical data from trials which are conducted at clinical facilities or in countries where the standard of care is potentially different from that of the United States;
- we may be unable to demonstrate that a product candidate’s clinical and other benefits outweigh its safety risks;
- such authorities may disagree with our interpretation of data from preclinical studies or clinical trials;
- such authorities may not agree that the data collected from clinical trials of our product candidates are acceptable or sufficient to support the submission of an application for regulatory approval or other submissions or to obtain regulatory approval in the United States or elsewhere, and such authorities may impose requirements for additional preclinical studies or clinical trials;
- such authorities may disagree regarding the formulation, labeling and/or the specifications of our product candidates;
- approval may be granted only for indications that are significantly more limited than what we apply for and/or with other significant restrictions on distribution and use;

- such authorities may fail to approve any required companion diagnostics to be used with our product candidates;
- such authorities may find deficiencies in the manufacturing processes or facilities of our third-party manufacturers with which we or any of our potential future collaborators contract for clinical and commercial supplies; or
- the approval policies or regulations of such authorities may significantly change in a manner rendering our or any of our potential future collaborators' clinical data insufficient for approval.

With respect to foreign markets, approval procedures vary among countries and, in addition to the foregoing risks, may involve additional product testing, administrative review periods and agreements with pricing authorities. In addition, events raising questions about the safety of certain marketed pharmaceuticals may result in increased cautiousness by the FDA and comparable foreign regulatory authorities in reviewing new products based on safety, efficacy or other regulatory considerations and may result in significant delays in obtaining regulatory approvals.

Even if we eventually complete clinical trials and receive approval to commercialize our product candidates, the FDA or comparable foreign regulatory authority may grant approval contingent on the performance of costly additional clinical trials, including Phase 4 clinical trials, and/or the implementation of a REMS. The FDA or the comparable foreign regulatory authority also may approve a product candidate for a more limited indication or patient population than we originally requested or may not approve the labeling that we believe is necessary or desirable for the successful commercialization of a product. Manufacturers of our products and manufacturers' facilities are also required to comply with cGMP regulations, which include requirements related to quality control and quality assurance, as well as the corresponding maintenance of records and documentation. Further, regulatory authorities must approve these manufacturing facilities before they can be used to manufacture our products, and these facilities are subject to continual review and periodic inspections by the FDA and other comparable foreign regulatory authorities for compliance with cGMP regulations.

Any delay in obtaining, or inability to obtain, applicable regulatory approval would delay or prevent commercialization of that product candidate and would materially adversely impact our business and prospects.

Even if we receive regulatory approval for any of our product candidates, we will be subject to ongoing obligations and continued regulatory review, which may result in significant additional expense. Additionally, our product candidates, if approved, could be subject to labeling and other restrictions and market withdrawal and we may be subject to penalties if we fail to comply with regulatory requirements or experience unanticipated problems with our products.

If the FDA, EMA or any other comparable regulatory authority approves any of our product candidates, the manufacturing processes, labeling, packaging, distribution, adverse event reporting, storage, advertising, promotion and recordkeeping for the product will be subject to extensive and ongoing regulatory requirements. These requirements include submissions of safety and other post-marketing information and reports, registration requirements and continued compliance with cGMPs, and good clinical practices, or GCPs, for any clinical trials that we conduct post-approval. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with our third-party manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may result in, among other things:

- restrictions on the marketing or manufacturing of the product, withdrawal of the product from the market, or voluntary product recalls;
- fines, untitled or warning letters or holds on clinical trials;
- refusal by the FDA, the EMA or any other comparable regulatory authority to approve pending applications or supplements to approved applications filed by us, or suspension or revocation of product approvals;

- product seizure or detention, or refusal to permit the import or export of products; and
- injunctions or the imposition of civil or criminal penalties.

Moreover, if any of our product candidates are approved, our product labeling, advertising and promotion will be subject to regulatory requirements and continuing regulatory review. The FDA strictly regulates the promotional claims that may be made about biopharmaceutical 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.

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 our product candidates, and harm our business, financial condition and results of operations.

In addition, the policies of the FDA, the EMA and other comparable regulatory authorities may change and additional government regulations may be enacted that could prevent, limit or delay regulatory approval of our product candidates. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may lose any marketing approval that we may have obtained, which would adversely affect our business, prospects and ability to achieve or sustain profitability.

We also 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 are slow or unable to adapt to changes in existing requirements or the adoption of new requirements, or if we are unable to maintain regulatory compliance, marketing approval that has been obtained may be lost and we may not achieve or sustain profitability.

We may expend our limited resources to pursue a particular product candidate or indication and fail to capitalize on product candidates or indications that may be more profitable or for which there is a greater likelihood of success.

Because we have limited financial and managerial resources, we must prioritize our research programs and will need to focus our discovery and development on select product candidates and indications. Correctly prioritizing our research and development activities is particularly important for us due to the breadth of potential product candidates and indications that we believe could be pursued using our gene engineering technologies. As a result, we may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may also relinquish valuable rights to that product candidate through collaboration, licensing or other royalty 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 may not be successful in our efforts to identify or discover additional product candidates in the future.

Our research programs may initially show promise in identifying potential product candidates, yet fail to yield product candidates for clinical development for a number of reasons, including:

- our inability to design such product candidates with the properties that we desire; or
- potential product candidates may, on further study, be shown to have harmful side effects or other characteristics that indicate that they are unlikely to be products that will receive marketing approval and achieve market acceptance.

Research programs to identify new product candidates require substantial technical, financial and human resources. If we are unable to identify suitable additional candidates for preclinical and clinical development, our opportunities to successfully develop and commercialize therapeutic products will be limited.

Risks Related to Manufacturing, Commercialization and Reliance on Third Parties

We rely on third parties to conduct our clinical trials and perform some of our research and preclinical studies. If these third parties do not satisfactorily carry out their contractual duties or fail to meet expected deadlines, our development programs may be delayed or subject to increased costs, each of which may have an adverse effect on our business and prospects.

We do not have the ability to conduct all aspects of our preclinical testing or clinical trials ourselves. As a result, we are and expect to remain dependent on third parties to conduct our ongoing Phase 1 clinical trial and any future clinical trials of our product candidates. Specifically, we expect CROs, clinical investigators, and consultants to play a significant role in the conduct of these trials and the subsequent collection and analysis of data. However, we will not be able to control all aspects of their activities. Nevertheless, we are responsible for ensuring that each of our trials is conducted in accordance with the applicable protocol and legal, regulatory and scientific standards, and our reliance on the CROs and other third parties does not relieve us of our regulatory responsibilities. We and our CROs are required to comply with GCP requirements, which are regulations and guidelines enforced by the FDA, the Competent Authorities of the Member States of the European Economic Area, and comparable foreign regulatory authorities for all of our product candidates in clinical development. Regulatory authorities enforce these GCP requirements through periodic inspections of trial sponsors, clinical trial investigators and clinical trial sites. If we or any of our CROs or clinical trial sites fail to comply with applicable GCP requirements, the data generated in our clinical trials may be deemed unreliable, and the FDA or comparable foreign regulatory authorities may require us to perform additional clinical trials before approving our marketing applications. In addition, our clinical trials must be conducted with product produced under cGMP regulations. Our failure to comply with these regulations may require us to stop and/or repeat clinical trials, which would delay the marketing approval process.

There is no guarantee that any such CROs, clinical trial investigators or other third parties on which we rely will devote adequate time and resources to our development activities or perform as contractually required. If any of these third parties fail to meet expected deadlines, adhere to our clinical protocols or meet regulatory requirements, otherwise performs in a substandard manner, or terminates its engagement with us, the timelines for our development programs may be extended or delayed or our development activities may be suspended or terminated. If any of our clinical trial sites terminates for any reason, we may experience the loss of follow-up information on subjects enrolled in such clinical trials unless we are able to transfer those subjects to another qualified clinical trial site, which may be difficult or impossible. In addition, clinical trial investigators for our clinical trials may serve as scientific advisors or consultants to us from time to time and may receive cash or equity compensation in connection with such services. If these relationships and any related compensation result in perceived or actual conflicts of interest, or the FDA or any comparable foreign regulatory authority concludes that the financial relationship may have affected the interpretation of the trial, the integrity of the data generated at the applicable clinical trial site may be questioned and the utility of the clinical trial itself may be jeopardized, which could result in the delay or rejection of any marketing application we submit by the FDA or any

comparable foreign regulatory authority. Any such delay or rejection could prevent us from commercializing our product candidates.

Furthermore, these third parties may also have relationships with other entities, some of which may be our competitors. If these third parties do not successfully carry out their contractual duties, meet expected deadlines or conduct our clinical trials in accordance with regulatory requirements or our stated protocols, we will not be able to obtain, or may be delayed in obtaining, marketing approvals for our product candidates and will not be able to, or may be delayed in our efforts to, successfully commercialize our products.

We contract with third parties for the manufacturing and supply of product candidates for use in preclinical testing and clinical trials, which supply may become limited or interrupted or may not be of satisfactory quality and quantity.

We do not have any manufacturing facilities. We produce in our laboratory relatively small quantities of product for evaluation in our research programs. We rely on third parties for the manufacture of our product candidates for preclinical and clinical testing, as well as for commercial manufacture if any of our product candidates are approved. We are evaluating whether to establish a pilot manufacturing facility and have entered into an option to lease property adjacent to our office for that purpose. Even if we are successful in establishing a pilot manufacturing facility, we expect that will continue to rely on third parties for various manufacturing needs. We currently have limited manufacturing arrangements and expect that each of our product candidates will only be covered by single source suppliers for the foreseeable future. This reliance increases the risk that we will not have sufficient quantities of our product candidates or products, if approved, or such quantities at an acceptable cost or quality, which could delay, prevent or impair our development or commercialization efforts.

Furthermore, all entities involved in the preparation of therapeutics for clinical trials or commercial sale, including our existing contract manufacturers for our product candidates, are subject to extensive regulation. Components of a finished therapeutic product approved for commercial sale or used in clinical trials must be manufactured in accordance with cGMP requirements. These regulations govern manufacturing processes and procedures, including record keeping, and the implementation and operation of quality systems to control and assure the quality of investigational products and products approved for sale. Poor control of production processes can lead to the introduction of contaminants, or to inadvertent changes in the properties or stability of our product candidates that may not be detectable in final product testing. We or our contract manufacturers must supply all necessary documentation in support of a Biologics License Application, or BLA, on a timely basis and must adhere to the FDA's Good Laboratory Practice regulations and cGMP regulations enforced by the FDA through its facilities inspection program. Comparable foreign regulatory authorities may require compliance with similar requirements. Our facilities and quality systems, and those of our third-party contract manufacturers, must pass a pre-approval inspection for compliance with the applicable regulations as a condition of marketing approval of our product candidates. We do not control the manufacturing activities of, and are completely dependent on, our contract manufacturers for compliance with cGMP regulations.

In the event that any of our manufacturers fails to comply with such requirements or to perform its obligations to us in relation to quality, timing or otherwise, or if our supply of components or other materials becomes limited or interrupted for other reasons, we may be forced to manufacture the materials ourselves, for which we currently do not have the capabilities or resources, or enter into an agreement with another third-party, which we may not be able to do on commercially reasonable terms, if at all. In particular, any replacement of our manufacturers could require significant effort and expertise because there may be a limited number of qualified replacements. In some cases, the technical skills or technology required to manufacture our product candidates may be unique or proprietary to the original manufacturer and we may have difficulty transferring such skills or technology to another third-party and a feasible alternative may not exist. In addition, certain of our product candidates and our own proprietary methods have never been produced or implemented outside of our company, and we may therefore experience delays to our development programs if and when we attempt to establish new third-party manufacturing arrangements for these product candidates or methods. These factors would increase

our reliance on such manufacturer or require us to obtain a license from such manufacturer in order to have another third-party manufacture our product candidates. If we are required to or voluntarily change manufacturers for any reason, we will be required to verify that the new manufacturer maintains facilities and procedures that comply with quality standards and with all applicable regulations and guidelines. The delays associated with the verification of a new manufacturer could negatively affect our ability to develop product candidates in a timely manner or within budget.

Our or a third-party's failure to execute on our manufacturing requirements, do so on commercially reasonable terms and comply with cGMP could adversely affect our business in a number of ways, including:

- an inability to initiate or continue clinical trials of our product candidates under development;
- delay in submitting regulatory applications, or receiving marketing approvals, for our product candidates;
- loss of the cooperation of future collaborators;
- subjecting third-party manufacturing facilities or our manufacturing facilities to additional inspections by regulatory authorities;
- requirements to cease development or to recall batches of our product candidates; and
- in the event of approval to market and commercialize our product candidates, an inability to meet commercial demands for our product or any other future product candidates.

Manufacturing gene engineered products is complex and we or our third-party manufacturers may encounter difficulties in production. If we or any of our third-party manufacturers encounter such difficulties, our ability to provide supply of our product candidates for clinical trials or our products for patients, if approved, could be delayed or prevented.

Manufacturing gene engineered products is complex and may require the use of innovative technologies to handle living cells. Manufacturing these products requires facilities specifically designed for and validated for this purpose and sophisticated quality assurance and quality control procedures are necessary. Slight deviations anywhere in the manufacturing process, including filling, labeling, packaging, storage and shipping and quality control and testing, may result in lot failures, product recalls or spoilage. When changes are made to the manufacturing process, we may be required to provide preclinical and clinical data showing the comparable identity, strength, quality, purity or potency of the products before and after such changes. If microbial, viral or other contaminations are discovered at manufacturing facilities, such facilities may need to be closed for an extended period of time to investigate and remedy the contamination, which could delay clinical trials and adversely harm our business. The use of biologically derived ingredients can also lead to allegations of harm, including infections or allergic reactions, or closure of product facilities due to possible contamination.

In addition, there are risks associated with large scale manufacturing for clinical trials or commercial scale including, among others, cost overruns, potential problems with process scale-up, process reproducibility, stability issues, compliance with good manufacturing practices, lot consistency and timely availability of raw materials. Even if we obtain marketing approval for any of our product candidates, there is no assurance that we or our manufacturers will be able to manufacture the approved product to specifications acceptable to the FDA or other comparable foreign regulatory authorities, to produce it in sufficient quantities to meet the requirements for the potential commercial launch of the product or to meet potential future demand. If we or our manufacturers are unable to produce sufficient quantities for clinical trials or for commercialization, our development and commercialization efforts would be impaired, which would have an adverse effect on our business, financial condition, results of operations and growth prospects.

Changes in methods of product candidate manufacturing may result in additional costs or delay.

As product candidates progress through preclinical to late-stage clinical trials to marketing approval and commercialization, it is common that various aspects of the development program, such as manufacturing

methods, are altered along the way in an effort to optimize yield, manufacturing batch size, minimize costs and achieve consistent quality and results. Such changes carry the risk that they will not achieve these intended objectives. Any of these changes could cause our product candidates to perform differently and affect the results of planned clinical trials or other future clinical trials conducted with the altered materials. This could delay completion of clinical trials, require the conduct of bridging clinical trials or the repetition of one or more clinical trials, increase clinical trial costs, delay approval of our product candidates and jeopardize our ability to commercialize our product candidates and generate revenue.

Any approved products may fail to achieve the degree of market acceptance by physicians, patients, hospitals, cancer treatment centers, healthcare payors and others in the medical community necessary for commercial success.

If any of our product candidates receive marketing approval, they may nonetheless fail to gain sufficient market acceptance by physicians, patients, healthcare payors and others in the medical community. For example, current cancer treatments like chemotherapy and radiation therapy are well established in the medical community, and physicians may continue to rely on these treatments. Most of our product candidates target mechanisms for which there are limited or no currently approved products, which may result in slower adoption by physicians, patients and payors. If our product candidates do not achieve an adequate level of acceptance, we may not generate significant product revenue and we may not become profitable. The degree of market acceptance of our product candidates, if approved for commercial sale, will depend on a number of factors, including:

- efficacy and potential advantages compared to alternative treatments;
- our ability to offer our products for sale at competitive prices;
- convenience and ease of administration compared to alternative treatments;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;
- the strength of marketing and distribution support; and
- the prevalence and severity of any side effects.

We may not be able to successfully commercialize our product candidates due to unfavorable pricing regulations or third-party coverage and reimbursement policies, which could make it difficult for us to sell our product candidates profitably.

Obtaining coverage and reimbursement approval for a product from a government or other third-party payor is a time-consuming and costly process, with uncertain results, that could require us to provide supporting scientific, clinical and cost effectiveness data for the use of our products to the payor. There may be significant delays in obtaining such coverage and reimbursement for newly approved products, and coverage may not be available, or may be more limited than the purposes for which the product is approved by the FDA or comparable foreign regulatory authorities. Moreover, eligibility for coverage and reimbursement does not imply that a product will be paid for in all cases or at a rate that covers our costs, including research, development, intellectual property, manufacture, sale and distribution expenses. Interim reimbursement levels for new products, if applicable, may also not be sufficient to cover our costs and may not be made permanent. Reimbursement rates may vary according to the use of the product and the clinical setting in which it is used, may be based on reimbursement levels already set for lower cost products and may be incorporated into existing payments for other services. Net prices for products may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors, by any future laws limiting drug prices and by any future relaxation of laws that presently restrict imports of product from countries where they may be sold at lower prices than in the United States.

There is significant uncertainty related to the insurance coverage and reimbursement of newly approved products. In the United States, there is no uniform policy among third-party payors for coverage and reimbursement. Third-party payors often rely upon Medicare coverage policy and payment limitations in setting reimbursement policies, but also have their own methods and approval process apart from Medicare coverage and reimbursement determinations. Therefore, one third-party payor's determination to provide coverage for a product does not assure that other payors will also provide coverage for the product.

Coverage and reimbursement by a third-party payor may depend upon a number of factors, including the third-party payor's determination that use of a product is:

- a covered benefit under its health plan;
- safe, effective and medically necessary;
- appropriate for the specific patient;
- cost-effective; and
- neither experimental nor investigational.

We cannot be sure that reimbursement will be available for any product that we commercialize and, if coverage and reimbursement are available, what the level of reimbursement will be. Obtaining reimbursement for our products may be particularly difficult because of the higher prices often associated with branded therapeutics and therapeutics administered under the supervision of a physician. Our inability to promptly obtain coverage and adequate reimbursement rates from both government-funded and private payors for any approved products that we develop could have a material adverse effect on our operating results, our ability to raise capital needed to commercialize products and our overall financial condition.

Reimbursement may impact the demand for, and the price of, any product for which we obtain marketing approval. Assuming we obtain coverage for a given product by a third-party payor, the resulting reimbursement payment rates may not be adequate or may require co-payments that patients find unacceptably high. Patients who are prescribed medications for the treatment of their conditions, and their prescribing physicians, generally rely on third-party payors to reimburse all or part of the costs associated with those medications. Patients are unlikely to use our products unless coverage is provided and reimbursement is adequate to cover all or a significant portion of the cost of our products. Therefore, coverage and adequate reimbursement is critical to new product acceptance. Coverage decisions may depend upon clinical and economic standards that disfavor new products when more established or lower cost therapeutic alternatives are already available or subsequently become available. Separate reimbursement for the product itself may or may not be available. Instead, the hospital or administering physician may be reimbursed only for providing the treatment or procedure in which our product is used. Further, from time to time, CMS revises the reimbursement systems used to reimburse health care providers, including the Medicare Physician Fee Schedule and Hospital Outpatient Prospective Payment System, which may result in reduced Medicare payments.

We expect to experience pricing pressures in connection with the sale of any of our product candidates due to the trend toward managed healthcare, the increasing influence of health maintenance organizations, and additional legislative changes. The downward pressure on healthcare costs in general, particularly prescription medicines, medical devices and surgical procedures and other treatments, has become very intense. As a result, increasingly high barriers are being erected to the successful commercialization of new products. Further, the adoption and implementation of any future governmental cost containment or other health reform initiative may result in additional downward pressure on the price that we may receive for any approved product.

Additionally, we or collaborators may develop companion diagnostic tests for use with our product candidates. We, or our collaborators, will be required to obtain coverage and reimbursement for these tests separate and apart from the coverage and reimbursement we may seek for our product candidates. While we have

not yet developed any companion diagnostic tests for our product candidates, if we do, there is significant uncertainty regarding our ability to obtain coverage and adequate reimbursement for the same reasons applicable to our product candidates.

Outside of the United States, many countries require approval of the sale price of a product before it can be marketed, and the pricing review period only begins after marketing or product licensing approval is granted. To obtain reimbursement or pricing approval in some of these countries, we may be required to conduct a clinical trial that compares the cost-effectiveness of our product candidate to other available therapies. In some foreign markets, prescription pharmaceutical pricing remains subject to continuing governmental control even after initial approval is granted. As a result, we might obtain marketing approval for a product candidate in a particular country, but then be subject to price regulations that delay our commercial launch of the product, possibly for lengthy time periods, and negatively impact the revenue, if any, we are able to generate from the sale of the product in that country. Adverse pricing limitations may hinder our ability to recoup our investment in one or more product candidates, even if such product candidates obtain marketing approval.

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

The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively, the Affordable Care Act, signed into law on March 23, 2010, includes a subtitle called the Biologics Price Competition and Innovation Act of 2009, or BPCIA, which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-licensed reference biological product. 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 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 our product candidates.

We believe that any of our product candidates approved as a biological product 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 our 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, once approved, will be substituted for any one of our reference products in a way that is similar to traditional generic substitution for non-biological products is not yet clear, and will depend on a number of marketplace and regulatory factors that are still developing.

If any approved products are subject to biosimilar competition sooner than we expect, we will face significant pricing pressure and our commercial opportunity will be limited.

If the market opportunities for any of our product candidates are smaller than we believe they are, our revenue may be adversely affected, and our business may suffer.

We are focused initially on the development of treatments for cancer. Our projections of addressable patient populations that have the potential to benefit from treatment with our product candidates are based on estimates.

If any of our estimates are inaccurate, the market opportunities for any of our product candidates could be significantly diminished and have an adverse material impact on our business.

Our reliance on third parties requires us to share our trade secrets, which increases the possibility that a competitor will discover them or that our trade secrets will be misappropriated or disclosed.

Because we rely on third parties to research and develop and to manufacture our product candidates, we must share trade secrets with them. We seek to protect our proprietary technology in part by entering into confidentiality agreements and, if applicable, material transfer agreements, consulting agreements or other similar agreements with our advisors, employees, third-party contractors and consultants prior to beginning research or disclosing proprietary information. These agreements typically limit the rights of the third parties to use or disclose our confidential information, including our trade secrets. Despite the contractual provisions employed when working with third parties, the need to share trade secrets and other confidential information increases the risk that such trade secrets become known by our competitors, are inadvertently incorporated into the technology of others, or are disclosed or used in violation of these agreements. Given that our proprietary position is based, in part, on our know-how and trade secrets, a competitor's independent discovery of our trade secrets or other unauthorized use or disclosure would impair our competitive position and may have a material adverse effect on our business.

In addition, these agreements typically restrict the ability of our advisors, employees, third-party contractors and consultants to publish data potentially relating to our trade secrets, although our agreements may contain certain limited publication rights. For example, any academic institution that we may collaborate with will likely expect to be granted rights to publish data arising out of such collaboration and any joint research and development programs may require us to share trade secrets under the terms of our research and development or similar agreements. Despite our efforts to protect our trade secrets, our competitors may discover our trade secrets, either through breach of our agreements with third parties, independent development or publication of information by any of our third-party collaborators. A competitor's discovery of our trade secrets would impair our competitive position and have an adverse impact on our business.

If any of our product candidates are approved for marketing and commercialization and we are unable to establish sales and marketing capabilities or enter into agreements with third parties to sell and market our product candidates, we will be unable to successfully commercialize our product candidates if and when they are approved.

We have no sales, marketing or distribution capabilities or experience. To achieve commercial success for any approved product for which we retain sales and marketing responsibilities, we must either develop a sales and marketing organization, which would be expensive and time consuming, or outsource these functions to other third parties. In the future, we may choose to build a focused sales and marketing infrastructure to sell, or participate in sales activities with our collaborators for, some of our product candidates if and when they are approved.

There are risks involved with both establishing our own sales and marketing capabilities and entering into arrangements with third parties to perform these services. For example, recruiting and training a sales force is expensive and time consuming and could delay any product launch. If the commercial launch of a product candidate for which we recruit a sales force and establish marketing capabilities is delayed or does not occur for any reason, we would have prematurely or unnecessarily incurred these commercialization expenses. This may be costly, and our investment would be lost if we cannot retain or reposition our sales and marketing personnel.

Factors that may inhibit our efforts to commercialize future products on our own include:

- our inability to recruit and retain adequate numbers of effective sales and marketing personnel;
- the inability of sales personnel to obtain access to physicians or persuade adequate numbers of physicians to prescribe any future products;

- the lack of complementary products to be offered by sales personnel, which may put us at a competitive disadvantage relative to companies with more extensive product portfolios; and
- unforeseen costs and expenses associated with creating an independent sales and marketing organization.

If we enter into arrangements with third parties to perform sales, marketing and distribution services, our product revenue or the profitability of these product revenue to us are likely to be lower than if we were to market and sell any products that we develop ourselves. In addition, we may not be successful in entering into arrangements with third parties to sell and market our product candidates or may be unable to do so on terms that are favorable to us. In entering into third-party marketing or distribution arrangements, any revenue we receive will depend upon the efforts of the third parties and we cannot assure you that such third parties will establish adequate sales and distribution capabilities or devote the necessary resources and attention to sell and market any future products effectively. If we do not establish sales and marketing capabilities successfully, either on our own or in collaboration with third parties, we will not be successful in commercializing our product candidates.

Even if we obtain FDA approval of any of our product candidates, we may never obtain approval or commercialize such products outside of the United States, which would limit our ability to realize their full market potential.

In order to market any products outside of the United States, we must establish and comply with numerous and varying regulatory requirements of other countries regarding safety and efficacy. Clinical trials conducted in one country may not be accepted by regulatory authorities in other countries, and regulatory approval in one country does not mean that regulatory approval will be obtained in any other country. Approval procedures vary among countries and can involve additional product testing and validation and additional administrative review periods. Seeking foreign regulatory approvals could result in significant delays, difficulties and costs for us and may require additional preclinical studies or clinical trials which would be costly and time consuming. Regulatory requirements can vary widely from country to country and could delay or prevent the introduction of our products in those countries. Satisfying these and other regulatory requirements is costly, time consuming, uncertain and subject to unanticipated delays. In addition, our failure to obtain regulatory approval in any country may delay or have negative effects on the process for regulatory approval in other countries. We do not have any product candidates approved for sale in any jurisdiction, including international markets, and we do not have experience in obtaining regulatory approval in international markets. If we fail to comply with regulatory requirements in international markets or to obtain and maintain required approvals, our ability to realize the full market potential of our products will be harmed.

Risks Related to Our In-Licenses and Other Strategic Agreements

We are currently party to several in-license agreements under which we acquired rights to use, develop, manufacture and/or commercialize certain of our gene engineering technologies and resulting product candidates. If we breach our obligations under these agreements, we may be required to pay damages, lose our rights to these technologies or both, which would adversely affect our business and prospects.

We rely, in part, on license and other strategic agreements, which subject us to various obligations, including diligence obligations with respect to development and commercialization activities, payment obligations for achievement of certain milestones and royalties on product sales, negative covenants and other material obligations. For example, with respect to P-BCMA-101 and P-PSMA-101, we license Centyrin binders under an agreement with Janssen Biotech Inc., with respect to P-BCMA-ALLO1, we license heavy chain only antibodies (VH) binders under an agreement with TeneoBio, Inc. and with respect to our Cas-CLOVER gene editing technology, which we use in the manufacture of P-BCMA-ALLO1, we license certain intellectual property under an agreement with Helmholtz-Zentrum München - Deutsches Forschungszentrum für Gesundheit und Umwelt GmbH. If we fail to comply with the obligations under our license agreements or use the intellectual property licensed to us in an unauthorized manner, we may be required to pay damages and our licensors may have the right to terminate the license. If our license agreements are terminated, we may not be able to develop,

manufacture, market or sell the products covered by our agreements and those being tested or approved in combination with such products. Such an occurrence could materially adversely affect the value of the product candidates being developed under any such agreement.

In addition, the agreements under which we license intellectual property or technology to or from third parties are complex, and certain provisions in such agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology or increase what we believe to be our 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. Moreover, if disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on commercially acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates.

Our business also would suffer if any current or future licensors fail to abide by the terms of the license, if the licensors fail to enforce licensed patents against infringing third parties, if the licensed patents or other rights are found to be invalid or unenforceable, or if we are unable to enter into necessary licenses on acceptable terms. Moreover, our licensors may own or control intellectual property that has not been licensed to us and, as a result, we may be subject to claims, regardless of their merit, that we are infringing or otherwise violating the licensor's rights.

In addition, while we cannot currently determine the amount of the royalty obligations we would be required to pay on sales of future products, if any, the amounts may be significant. The amount of our future royalty obligations will depend on the technology and intellectual property we use in products that we successfully develop and commercialize, if any. Therefore, even if we successfully develop and commercialize products, we may be unable to achieve or maintain profitability.

If we are unable to successfully obtain rights to required third-party intellectual property rights or maintain the existing intellectual property rights we have, we may have to abandon development of the relevant research programs or product candidates and our business, financial condition, results of operations and prospects could suffer.

We may not realize the benefits of any acquisitions, in-license or strategic alliances that we enter into.

We have entered into in-license agreements with multiple licensors and in the future may seek and form strategic alliances, create joint ventures or collaborations, or enter into acquisitions or additional licensing arrangements with third parties that we believe will complement or augment our existing technologies and product candidates.

These transactions can entail numerous operational and financial risks, including exposure to unknown liabilities, disruption of our business and diversion of our management's time and attention in order to manage a collaboration or develop acquired products, product candidates or technologies, incurrence of substantial debt or dilutive issuances of equity securities to pay transaction consideration or costs, higher than expected collaboration, acquisition or integration costs, write-downs of assets or goodwill or impairment charges, increased amortization expenses, difficulty and cost in facilitating the collaboration or combining the operations and personnel of any acquired business, impairment of relationships with key suppliers, manufacturers or customers of any acquired business due to changes in management and ownership and the inability to retain key employees of any acquired business. As a result, if we enter into acquisition or in-license agreements or strategic partnerships, we may not be able to realize the benefit of such transactions if we are unable to successfully integrate them with our existing operations and company culture, which could delay our timelines or otherwise adversely affect our business. We also cannot be certain that, following a strategic transaction or license, we will achieve the revenue or specific net income that justifies such transaction or such other benefits that led us to enter into the arrangement.

We may wish to form collaborations in the future with respect to our product candidates, but may not be able to do so or to realize the potential benefits of such transactions, which may cause us to alter or delay our development and commercialization plans.

The development and potential commercialization of our product candidates will require substantial additional capital to fund expenses. We may, in the future, decide to collaborate with other biopharmaceutical companies for the development and potential commercialization of those product candidates, including in territories outside the United States or for certain indications. We will face significant competition in seeking appropriate collaborators. We may not be successful in our efforts to establish a strategic partnership or other alternative arrangements for our product candidates because they may be deemed to be at too early of a stage of development for collaborative effort and third parties may not view our product candidates as having the requisite potential to demonstrate safety and efficacy. If and when we collaborate with a third-party for development and commercialization of a product candidate, we can expect to relinquish some or all of the control over the future success of that product candidate to the third-party. Our ability to 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 our technologies, product candidates and market opportunities. The collaborator 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 for our product candidate. We may also be restricted under any license agreements from entering into agreements on certain terms or at all with potential collaborators.

Collaborations are complex and time-consuming to negotiate and document. 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 and changes to the strategies of the combined company. As a result, we may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we are unable to do so, we may have to curtail the development of such product candidate, reduce or delay one or more of our other development programs, delay the potential commercialization or reduce the scope of any planned sales or marketing activities for such product candidate, or increase our expenditures and undertake development, manufacturing or commercialization activities at our own expense. If we elect to increase our expenditures to fund development, manufacturing 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. If we do not have sufficient funds, we may not be able to further develop our product candidates or bring them to market and generate product revenue.

Our product candidates may also require specific components to work effectively and efficiently, and rights to those components may be held by others. We may be unable to in-license any compositions, methods of use, processes or other third party intellectual property rights from third parties that we identify. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, which would harm our business. Even if we are able to obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. In that event, we may be required to expend significant time and resources to develop or license replacement technology.

Risks Related to Our Industry and Business Operations

Our employees, principal investigators, consultants and commercial partners may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements and insider trading.

We are exposed to the risk of fraud or other misconduct by our employees, principal investigators, consultants and commercial partners. Misconduct by these parties could include intentional failures to comply with the regulations of the FDA and non-U.S. regulators, provide accurate information to the FDA and non-U.S. regulators, 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, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. Such misconduct could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and cause serious harm to our reputation. It is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us those actions could have a significant impact on our business, including the imposition of significant civil, criminal and administrative penalties, damages, fines, disgorgement, individual imprisonment, exclusion from government funded healthcare programs, such as Medicare and Medicaid, contractual damages, reputational harm, diminished profits and future earnings, additional reporting obligations and oversight if subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws, and the curtailment or restructuring of our operations.

We face potential product liability, and, if successful claims are brought against us, we may incur substantial liability and costs. If the use of our product candidates harms patients or is perceived to harm patients even when such harm is unrelated to our product candidates, our regulatory approvals could be revoked or otherwise negatively impacted and we could be subject to costly and damaging product liability claims.

The use of our product candidates in clinical trials and the sale of any products for which we obtain marketing approval exposes us to the risk of product liability claims. Product liability claims might be brought against us by consumers, healthcare providers, pharmaceutical companies or others selling or otherwise coming into contact with our products. There is a risk that our product candidates may induce adverse events. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- impairment of our business reputation;
- withdrawal of clinical trial participants;
- costs due to related litigation;
- distraction of management’s attention from our primary business;
- substantial monetary awards to patients or other claimants;
- the inability to commercialize our product candidates; and
- decreased demand for our product candidates, if approved for commercial sale.

We carry product liability insurance of $5.0 million per occurrence and $5.0 million aggregate limit. We believe our product liability insurance coverage is sufficient in light of our current clinical programs; however, we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses due to liability. If and when we obtain marketing approval for product candidates, we intend to expand our insurance coverage to include the sale of commercial products; however, we may be unable to obtain product liability insurance on commercially reasonable terms or in adequate amounts. On occasion, large judgments have been awarded in class action lawsuits based on drugs or medical treatments that had unanticipated adverse effects. A successful product liability claims, or series of claims brought against us could cause our stock price to decline and, if judgments exceed our insurance coverage, could adversely affect our results of operations and business.

Patients with cancer and other diseases targeted by our product candidates are often already in severe and advanced stages of disease and have both known and unknown significant pre-existing and potentially life-

threatening health risks. During the course of treatment, patients may suffer adverse events, including death, for reasons that may be related to our product candidates. Such events could subject us to costly litigation, require us to pay substantial amounts of money to injured patients, delay, negatively impact or end our opportunity to receive or maintain regulatory approval to market our products, or require us to suspend or abandon our commercialization efforts. Even in a circumstance in which we do not believe that an adverse event is related to our products, the investigation into the circumstance may be time-consuming or inconclusive. These investigations may interrupt our sales efforts, delay our regulatory approval process in other countries, or impact and limit the type of regulatory approvals our product candidates receive or maintain. As a result of these factors, a product liability claim, even if successfully defended, could have a material adverse effect on our business, financial condition or results of operations.

We will incur significant 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.

As a public company, we will incur significant legal, accounting and other expenses that we did not incur as a private company. In addition, the Sarbanes-Oxley Act, as well as rules subsequently implemented by the Securities and Exchange Commission, or SEC, and The Nasdaq Global Select Market have imposed various requirements on public companies. In July 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act, was enacted. There are significant corporate governance and executive compensation related provisions in the Dodd-Frank Act that require the SEC to adopt additional rules and regulations in these areas such as “say on pay” and proxy access. Recent legislation permits smaller “emerging growth companies” to implement many of these requirements over a longer period and up to five years from the pricing of this offering. We intend to take advantage of this new legislation but cannot guarantee that we will not be required to implement these requirements sooner than budgeted or planned and thereby incur unexpected expenses. Stockholder activism, the current political environment and the current high level of government intervention and regulatory reform may lead to substantial new regulations and disclosure obligations, which may lead to additional compliance costs and impact the manner in which we operate our business in ways we cannot currently anticipate. 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 and will make some activities more time-consuming and costlier. For example, we expect these rules and regulations to make it more difficult and more expensive for us to obtain director and officer liability insurance and we may be required to incur substantial costs to maintain our current levels of such coverage. We estimate that we will annually incur approximately $2.0 million to $3.0 million in additional expenses to comply with the requirements imposed on us as a public company.

We are highly dependent on our key personnel, and if we are not successful in attracting and retaining highly qualified personnel, we may not be able to successfully implement our business strategy.

Our ability to compete in the highly competitive biotechnology and pharmaceutical industries depends upon our ability to attract and retain highly qualified managerial, scientific and medical personnel. We are highly dependent on our management, scientific and medical personnel, including our President and Chief Executive Officer, our Chief Business and Financial Officer, our Chief Medical Officer and our Vice President, Finance. The loss of the services of any of our executive officers, other key employees, and other scientific and medical advisors, and our inability to find suitable replacements could result in delays in product development and harm our business.

We conduct substantially all of our operations at our facilities in San Diego. This region is headquarters to many other biopharmaceutical companies and many academic and research institutions. Competition for skilled personnel in our market is intense and may limit our ability to hire and retain highly qualified personnel on acceptable terms or at all.

To induce valuable employees to remain at our company, in addition to salary and cash incentives, we have provided stock options that vest over time. The value to employees of stock options that vest over time may be

significantly affected by movements in our stock price that are beyond our control and may at any time be insufficient to counteract more lucrative offers from other companies. Despite our efforts to retain valuable employees, members of our management, scientific and development teams may terminate their employment with us on short notice. Although we have employment agreements with certain of our key employees, these employment agreements provide for at-will employment, which means that any of our employees could leave our employment at any time, with or without notice. Other than for our President and Chief Executive Officer, we do not maintain "key person" insurance policies on the lives of these individuals or the lives of any of our other employees. Our success also depends on our ability to continue to attract, retain and motivate highly skilled junior, mid-level and senior managers as well as junior, mid-level and senior scientific and medical personnel.

We expect to expand our development, regulatory and operational capabilities and, as a result, we may encounter difficulties in managing our growth, which could disrupt our operations.

As of September 30, 2018, we had 46 full-time employees. As we advance our research and development programs, we expect to experience significant growth in the number of our employees and the scope of our operations, particularly in the areas of clinical development, quality, regulatory affairs and, if any of our product candidates receives marketing approval, sales, marketing and distribution. To manage our anticipated future growth, we must:

- identify, recruit integrate, maintain and motivate additional qualified personnel;
- manage our development efforts effectively, including the initiation and conduct of clinical trials for our product candidates, both as monotherapy and in combination with other intra-portfolio product candidates; and
- improve our operational, financial and management controls, reporting systems and procedures.

Our future financial performance and our ability to develop, manufacture and commercialize our product candidates will depend, in part, on our ability to effectively manage any future growth, and our management may also have to divert financial and other resources, and a disproportionate amount of its attention away from day-to-day activities in order to devote a substantial amount of time, to managing these growth activities.

If we are not able to effectively expand our organization by hiring new employees and expanding our groups of consultants and contractors, we may not be able to successfully implement the tasks necessary to further develop and commercialize our product candidates and, accordingly, may not achieve our research, development and commercialization goals.

We face substantial competition, which may result in others discovering, developing or commercializing products more quickly or marketing them more successfully than us.

The development and commercialization of new products is highly competitive. We compete in the segments of the pharmaceutical, biotechnology and other related markets that develop immunotherapies for the treatment of cancer. 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 or that would render any products that we may develop obsolete or non-competitive. Our competitors also may obtain marketing 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. Moreover, with the proliferation of new drugs and therapies into oncology, we expect to face increasingly intense competition as new technologies become available. If we fail to stay at the forefront of technological change, we may be unable to compete effectively. Any product candidates that we successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future. The highly competitive nature of and rapid technological changes in the biotechnology and pharmaceutical industries could render our product candidates or our technology obsolete, less competitive or uneconomical.

Other products in the same class as some of our product candidates have already been approved or are further along in development. As more product candidates within a particular class of biopharmaceutical products proceed through clinical development to regulatory review and approval, the amount and type of clinical data that may be required by regulatory authorities may increase or change. Consequently, the results of our clinical trials for product candidates in those class will likely need to show a risk benefit profile that is competitive with or more favorable than those products and product candidates in order to obtain marketing approval or, if approved, a product label that is favorable for commercialization. If the risk benefit profile is not competitive with those products or product candidates, we may have developed a product that is not commercially viable, that we are not able to sell profitably or that is unable to achieve favorable pricing or reimbursement. In such circumstances, our future product revenue and financial condition would be materially and adversely affected.

Specifically, there are many companies pursuing a variety of approaches to CAR-T therapies, including Adaptimmune Therapeutics plc, Allogene, Inc., Autolus Ltd., Bellicum Pharmaceuticals Inc., Bluebird Bio, Inc., Cellectis S.A., Janssen Pharmaceuticals Inc., Juno Therapeutics, Inc. (which was recently acquired by Celgene Corporation), Kite Pharma, Inc. (a Gilead Sciences, Inc. company), Nanjing Legend Biotech, and Novartis AG. Immunotherapy and gene therapy approaches are further being pursued by several smaller biotechnology companies as well as larger pharmaceutical companies. We also face competition from non-cell-based treatments offered by companies such as Amgen Inc., AstraZeneca plc, Bristol-Myers Squibb Company, F. Hoffman-La Roche AG, GlaxoSmithKline plc, Merck & Co., Inc. and Pfizer Inc. Many of our competitors, either alone or with their collaboration partners, have substantially greater financial, technical and other resources, such as larger research and development staff and/or greater expertise in research and development, manufacturing, preclinical testing and conducting clinical trials.

Mergers and acquisitions in the pharmaceutical and biotechnology industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller and other early stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These third parties compete with us in recruiting and retaining qualified scientific and management personnel, establishing clinical trial sites and subject enrollment for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

The key competitive factors affecting the success of all of our programs are likely to be their efficacy, safety, convenience, and availability of reimbursement. If we are not successful in developing, commercializing and achieving higher levels of reimbursement than our competitors, we will not be able to compete against them and our business would be materially harmed.

Our internal information technology systems, or those of our third-party CROs or other contractors or consultants, may fail or suffer security breaches, loss or leakage of data, and other disruptions, which could result in a material disruption of our product candidates' development programs, compromise sensitive information related to our business or prevent us from accessing critical information, potentially exposing us to liability or otherwise adversely affecting our business.

We are increasingly dependent upon information technology systems, infrastructure and data to operate our business. In the ordinary course of business, we collect, store and transmit confidential information (including but not limited to intellectual property, proprietary business information and personal information). It is critical that we do so in a secure manner to maintain the confidentiality and integrity of such confidential information. We also have outsourced elements of our operations to third parties, and as a result we manage a number of third-party contractors who have access to our confidential information.

Despite the implementation of security measures, given their size and complexity and the increasing amounts of confidential information that they maintain, our internal information technology systems and those of our third-party CROs and other contractors and consultants are potentially vulnerable to breakdown or other

damage or interruption from service interruptions, system malfunction, natural disasters, terrorism, war and telecommunication and electrical failures, as well as security breaches from inadvertent or intentional actions by our employees, contractors, consultants, business partners, and/or other third parties, or from cyber-attacks by malicious third parties (including the deployment of harmful malware, ransomware, denial-of-service attacks, social engineering and other means to affect service reliability and threaten the confidentiality, integrity and availability of information), which may compromise our system infrastructure or lead to data leakage. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and reputational damage and the further development and commercialization of our product candidates could be delayed.

While we have not experienced any such system failure, accident or security breach to date, we cannot assure you that our data protection efforts and our investment in information technology will prevent significant breakdowns, data leakages, breaches in our systems or other cyber incidents that could have a material adverse effect upon our reputation, business, operations or financial condition. For example, if such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our programs and the development of our product candidates could be delayed. In addition, the loss of clinical trial data for our product candidates could result in delays in our marketing approval efforts and significantly increase our costs to recover or reproduce the data. Furthermore, significant disruptions of our internal information technology systems or security breaches could result in the loss, misappropriation, and/or unauthorized access, use, or disclosure of, or the prevention of access to, confidential information (including trade secrets or other intellectual property, proprietary business information, and personal information), which could result in financial, legal, business, and reputational harm to us. For example, any such event that leads to unauthorized access, use, or disclosure of personal information, including personal information regarding our clinical trial subjects or employees, could harm our reputation directly, compel us to comply with federal and/or state breach notification laws and foreign law equivalents, subject us to mandatory corrective action, and otherwise subject us to liability under laws and regulations that protect the privacy and security of personal information, which could result in significant legal and financial exposure and reputational damages that could potentially have an adverse effect on our business.

We or the third parties upon whom we depend may be adversely affected by earthquakes, fires or other natural disasters and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

Our headquarters and main research facility are located in San Diego, California, which in the past has experienced severe earthquakes and fires. If these earthquakes, fires, other natural disasters, terrorism and similar unforeseen events beyond our control prevented us from using all or a significant portion of our headquarters or research facility, it may be difficult or, in certain cases, impossible for us to continue our business for a substantial period of time. We do not have a disaster recovery or business continuity plan in place and may incur substantial expenses as a result of the absence or limited nature of our internal or third-party service provider disaster recovery and business continuity plans, which, particularly when taken together with our lack of earthquake insurance, could have a material adverse effect on our business. Furthermore, integral parties in our supply chain are operating from single sites, increasing their vulnerability to natural disasters or other sudden, unforeseen and severe adverse events. If such an event were to affect our supply chain, it could have a material adverse effect on our ability to conduct our clinical trials, our development plans and business.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

We have incurred substantial losses during our history and do not expect to become profitable in the near future, and we may never achieve profitability. Unused losses for the tax year ended December 31, 2017 and prior tax years will carry forward to offset future taxable income, if any, until such unused losses expire. Unused losses generated after December 31, 2017, under new tax legislation will not expire and may be carried forward indefinitely but will be only deductible to the extent of 80% of current year taxable income in any given year. In addition, both our current and our future unused losses may be subject to limitation under Sections 382 and 383

of the Internal Revenue Code of 1986, as amended, or the Code, if we undergo an "ownership change," generally defined as a greater than 50 percentage point change (by value) in its equity ownership by certain stockholders over a three-year period. As a result, if we earn net taxable income our pre-2018 net operating loss carryforwards may expire prior to being used, our net operating loss carryforwards generated in 2018 and thereafter will be subject to a percentage limitation and, if we undergo an ownership change, our ability to use all of our pre-change net operating loss carryforwards, or NOLs, and other pre-change tax attributes (such as research tax credits) to offset its post-change income or taxes may be limited. As a result, if we earn net taxable income, our ability to use our pre-change NOLs to offset such taxable income may be subject to limitations. Similar provisions of state tax law may also apply to limit our use of accumulated state tax attributes. In addition, at the state level, there may be periods during which the use of NOLs is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed. 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. As of September 30, 2018, we had aggregate federal NOLs of approximately $63.6 million and aggregate U.S. research and development credits of approximately $2.3 million.

U.S. federal income tax reform could adversely affect us.

On December 22, 2017, President Trump signed into law new legislation, known as the Tax Cuts and Jobs Act of 2017, or the Tax Act, that significantly revises 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 earnings (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. We do not expect the Tax Act to have a material impact to our current projection of minimal cash taxes for the near future. However, we continue to examine the impact that the Tax Act may have on our business in the longer term. Accordingly, 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 uncertain 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 also uncertain and could be adverse. We urge prospective investors to consult with their legal and tax advisors with respect to the Tax Act and the potential tax consequences of investing in or holding our common stock.

Failure to comply with health and data protection laws and regulations could lead to government enforcement actions (which could include civil or criminal penalties), private litigation, and/or adverse publicity and could negatively affect our operating results and business.

We and any potential collaborators may be subject to federal, state, and foreign data protection laws and regulations (i.e., laws and regulations that address privacy and data security). In the United States, numerous federal and state laws and regulations, including federal health information privacy laws, state data breach notification laws, state health information privacy laws, and federal and state consumer protection laws (e.g., Section 5 of the Federal Trade Commission Act), that govern the collection, use, disclosure, and protection of health-related and other personal information could apply to our operations or the operations of our collaborators. In addition, we may obtain health information from third parties (including research institutions from which we obtain clinical trial data) that are subject to privacy and security requirements under federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, or HITECH. Depending on the facts and circumstances, we could be subject to criminal penalties if we knowingly obtain, use, or disclose individually identifiable health information maintained by a HIPAA-covered entity in a manner that is not authorized or permitted by HIPAA.

Internationally, virtually every jurisdiction in which we operate has established its own data security and privacy legal framework that may also apply to health-related and other personal information obtained outside of

the United States, including but not limited to the European Union, or EU. The unstable nature of EU's data protection landscape may result in possible significant operational costs for internal compliance and risk to our business. While we could take steps to mitigate the impact on us, such as implementing standard contractual clauses and self-certifying under the EU-US Privacy Shield, the efficacy and longevity of these mechanisms remains uncertain. In addition, the EU has adopted the General Data Protection Regulation, or GDPR, which went into effect on May 25, 2018 and contains numerous requirements and changes from existing EU law, including more robust obligations on data controllers and data processors, and heavier documentation requirements for data protection compliance programs by companies. Specifically, the GDPR contains numerous privacy-related changes for companies operating in the EU, including greater control for data subjects (e.g., the "right to be forgotten"), increased data portability for EU consumers, data breach notification requirements, and increased fines. In particular, under the GDPR, fines of up to 20 million euros or up to 4% of the annual global revenue of the noncompliant company, whichever is greater, could be imposed for violations of certain of the GDPR's requirements. The GDPR requirements would apply not only to third-party transactions, but also to transfers of information between us and our subsidiaries, including employee information.

Compliance with the GDPR may cause us to incur substantial operational costs or require us to change our business practices. Despite our efforts to bring practices into compliance before the effective date of the GDPR, we may not be successful either due to internal or external factors such as resource allocation limitations or a lack of vendor cooperation. Non-compliance could result in proceedings against us by governmental entities, customers, data subjects, or others. We may also experience difficulty retaining or obtaining new European or multi-national customers due to the legal requirements, compliance cost, potential risk exposure, and uncertainty for these entities, and we may experience significantly increased liability with respect to these customers pursuant to the terms set forth in our engagements with them. We may find it necessary to establish systems to maintain personal data originating from the EU in the European Economic Area, which may involve substantial expense and distraction from other aspects of our business. In the meantime, there could be uncertainty as to how to comply with EU privacy law.

Failure to comply with U.S. and international data protection laws and regulations could result in government enforcement actions (which could include civil or criminal penalties), private litigation, breach reporting requirements and/or adverse publicity and could negatively affect our operating results and business. Moreover, clinical trial subjects about whom we or our potential collaborators obtain information, as well as the providers who share this information with us, may contractually limit our ability to use and disclose the information. Claims that we have violated individuals' privacy rights, failed to comply with data protection laws, or breached our contractual obligations, even if we are not found liable, could be expensive and time-consuming to defend and could result in adverse publicity that could harm our business.

Changes in healthcare law and implementing regulations, as well as changes in healthcare policy, may impact our business in ways that we cannot currently predict, and may have a significant adverse effect on our business and results of operations.

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 our ability to profitably sell any product candidates for which we obtain marketing approval. Among policy makers and payors in the United States and elsewhere, including in the European Union, there is significant interest in promoting changes in healthcare systems with the stated goals of containing healthcare costs, improving quality and/or expanding access. In the United States, the pharmaceutical industry has been a particular focus of these efforts and has been significantly affected by major legislative initiatives.

The Affordable Care Act, substantially changed the way healthcare is financed by both the government and private insurers, and significantly impacts the U.S. pharmaceutical industry. The Affordable Care Act, among other things: (i) introduced a new methodology by which rebates owed by manufacturers under the Medicaid

Drug Rebate Program are calculated for certain drugs and biologics that are inhaled, infused, instilled, implanted or injected and not generally dispensed through retail community pharmacies; (ii) increased the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program; (iii) established a branded prescription drug fee that pharmaceutical manufacturers of branded prescription drugs must pay to the federal government; (iv) expanded the list of covered entities eligible to participate in the 340B drug pricing program by adding new entities to the program; (v) established a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% (and 70% commencing on 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; (vi) extended manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations; (vii) expanded eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to additional individuals and by adding new mandatory eligibility categories for individuals with income at or below 133% of the federal poverty level, thereby potentially increasing manufacturers' Medicaid rebate liability; (viii) created a licensure framework for follow on biologic products; (ix) established a Center for Medicare Innovation at the Centers for Medicare and Medicaid Services, or CMS, to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending; and (x) created a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research.

Since its enactment, there have been judicial and Congressional challenges to certain aspects of the Affordable Care Act, as well as recent efforts by the Trump administration to repeal or replace and replace certain aspects of the Affordable Care Act. Since January 2017, President Trump has signed two Executive Orders and other directives designed to delay the implementation of certain provisions of the Affordable Care Act or otherwise circumvent some of the requirements for health insurance mandated by the Affordable Care Act. In addition, CMS issued a final rule in 2018 that will give states greater flexibility, starting in 2020, in setting benchmarks for insurers in the individual and small group marketplaces, which may have the effect of relaxing the essential health benefits required under the Affordable Care Act for plans sold through such marketplaces. Concurrently, Congress has considered legislation that would repeal or repeal and replace portions of the Affordable Care Act. While Congress has not passed comprehensive repeal legislation, the Tax Act 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, and the medical device excise tax on non-exempt medical devices. Further, the Bipartisan Budget Act of 2018, or the BBA, 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. Congress may consider other legislation to repeal and replace elements of the Affordable Care Act. We continue to evaluate the effect that the Affordable Care Act and its possible repeal and replacement has on our business. It is uncertain the extent to which any such changes may impact our business or financial condition.

Other legislative changes have been proposed and adopted since the Affordable Care Act was enacted. These changes include aggregate reductions to Medicare payments to providers of 2% per fiscal year pursuant to the Budget Control Act of 2011, which began in 2013 and, due to legislative amendments to the statute, including the BBA, will remain in effect through 2027 unless additional Congressional action is taken. New laws may result in additional reductions in Medicare and other healthcare funding, which may materially adversely affect customer demand and affordability for our products and, accordingly, the results of our financial operations. In

January 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. Additional changes that may affect our business include the expansion of new programs such as Medicare payment for performance initiatives for physicians under the Medicare Access and CHIP Reauthorization Act of 2015, which will first affect physician payment in 2019. At this time, it is unclear how the introduction of the Medicare quality payment program will impact overall physician reimbursement.

Also, there has been heightened governmental scrutiny recently over the manner in which drug manufacturers set prices for their marketed products, which have resulted in several 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 drug products. At the federal level, the Trump administration's budget proposal for fiscal year 2019 contains further drug price control measures that could be enacted during the 2019 budget process or in other future legislation, including, for example, measures to permit Medicare Part D plans to negotiate the price of certain drugs under Medicare Part B, to allow some states to negotiate drug prices under Medicaid, and to eliminate cost sharing for generic drugs for low-income patients. 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, or HHS, has already started the process of soliciting feedback on some of these measures and, at the same, is immediately implementing others under its existing authority. For example, in September 2018, CMS announced that it will allow Medicare Advantage Plans the option to use step therapy for Part B drugs beginning January 1, 2019, and in October 2018, CMS proposed a new rule that would require direct-to-consumer television advertisements of prescription drugs and biological products, for which payment is available through or under Medicare or Medicaid, to include in the advertisement the Wholesale Acquisition Cost, or list price, of that drug or biological product. Although a number of these, and other 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 and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures. For example, California requires pharmaceutical companies to notify health insurers and government health plans at least 60 days before any scheduled increases in the prices of their products if they exceed 16% over a two-year period, and further requiring pharmaceutical companies to explain the reasons for such increase. Similarly, Vermont recently passed a law which requires certain pharmaceutical manufacturers to disclose price information on prescription drugs, which is in addition to a prior law from 2016 that requires pharmaceutical manufacturer price reporting.

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 framework for certain patients to access certain investigational new drug products that have completed a Phase I 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 these and other healthcare reform measures that may be adopted in the future may result in more rigorous coverage criteria and lower reimbursement and in additional downward pressure on the price that we receive for any approved product. Any reduction in reimbursement from Medicare or other government-funded programs may result in a similar reduction in payments from private payors. The implementation of cost-

containment measures or other healthcare reforms may prevent us from being able to generate revenue, attain profitability or commercialize our drugs, once marketing approval is obtained.

In the European Union, coverage and reimbursement status of any product candidates for which we obtain regulatory approval are provided for by the national laws of EU Member States. The requirements may differ across the EU Member States. Also, at national level, actions have been taken to enact transparency laws regarding payments between pharmaceutical companies and health care professionals.

We are subject to applicable fraud and abuse, transparency, government price reporting, and other healthcare laws and regulations. If we are unable to comply, or have not fully complied, with such laws, we could face substantial penalties.

Healthcare providers, physicians and third-party payors will play a primary role in the recommendation and prescription of any future product candidates we may develop and any product candidates for which we obtain marketing approval. Our current and future arrangements with third-party payors, healthcare provider and customers expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may affect the business or financial arrangements and relationships through which we research, market, sell and distribute our products. The laws that may affect our ability to operate include, but are not limited to:

- the federal Anti-Kickback Statute, which prohibits any person or entity from, among other things, knowingly and willfully soliciting, receiving, offering or paying any remuneration, directly or indirectly, overtly or covertly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, order or recommendation of an item or service reimbursable, in whole or in part, under a federal healthcare program, such as the Medicare and Medicaid programs. The term "remuneration" has been broadly interpreted to include anything of value. The federal Anti-Kickback Statute has also been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, and purchasers, on the other the other hand. There are a number of statutory exceptions and regulatory safe harbors protecting some common activities from prosecution, but these exceptions and safe harbors are narrowly drawn. Practices that are alleged to be intended to induce prescribing, purchases or recommendations, or include any payments of more than fair market value, may be subject to scrutiny if they do not qualify for an exception or safe harbor;
- federal civil and criminal false claims laws and civil monetary penalty laws, such as the False Claims Act, or FCA, which can be enforced by private citizens through civil qui tam actions, prohibits individuals or entities from, among other things, knowingly presenting, or causing to be presented, false, fictitious or fraudulent claims for payment of federal funds, and knowingly making, using or causing to be made or used a false record or statement material to a false or fraudulent claim to avoid, decrease or conceal an obligation to pay money to the federal government. For example, pharmaceutical companies have been prosecuted under the FCA in connection with, among other things their alleged off-label promotion of drugs, engaging in sham consulting arrangements with physicians, concealing price concessions in the pricing information submitted to the government for government price reporting purposes, and providing free product to customers with the expectation that the customers would bill federal health care programs for the product. In addition, a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the FCA. As a result of a modification made by the Fraud Enforcement and Recovery Act of 2009, a claim includes "any request or demand" for money or property presented to the U.S. government. In addition, manufacturers can be held liable under the FCA even when they do not submit claims directly to government payors if they are deemed to "cause" the submission of false or fraudulent claims;
- HIPAA which, among other things, imposes criminal liability for executing or attempting to execute a scheme to defraud any healthcare benefit program, including private third-party payors, knowingly and willfully embezzling or stealing from a healthcare benefit program, willfully obstructing a criminal investigation of a healthcare offense, and creates federal criminal laws that prohibit knowingly and

willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement or representation, or making or using any false writing or document knowing the same to contain any materially false, fictitious or fraudulent statement or entry in connection with the delivery of or payment for healthcare benefits, items or services;

- HIPAA, as amended by HITECH and their implementing regulations, which imposes privacy, security and breach reporting obligations with respect to individually identifiable health information upon covered entities and their respective business associates. HITECH also created new tiers of civil monetary penalties, amended HIPAA to make civil and criminal penalties directly applicable to business associates, and gave state attorneys general new authority to file civil actions for damages or injunctions in U.S. federal courts to enforce the federal HIPAA laws and seek attorneys' fees and costs associated with pursuing federal civil actions;
- the federal transparency requirements under the Physician Payments Sunshine Act, created under the Affordable Care Act, which requires, among other things, certain manufacturers of drugs, devices, biologics and medical supplies reimbursed under Medicare, Medicaid, or the Children's Health Insurance Program to report to CMS information related to payments and other transfers of value provided to physicians and teaching hospitals and physician ownership and investment interests, including such ownership and investment interests held by a physician's immediate family members;
- state and foreign law equivalents of each of the above federal laws, such as anti-kickback and false claims laws, that may impose similar or more prohibitive restrictions, and may apply to items or services reimbursed by any non-governmental third-party payors, including private insurers; and
- state and foreign laws that require pharmaceutical companies to implement compliance programs, comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government, or to track and report gifts, compensation and other remuneration provided to physicians and other health care providers, state and local laws that require the registration of pharmaceutical sales representatives, and other federal, state and foreign laws that govern the privacy and security of health information or personally identifiable information in certain circumstances, including state health information privacy and data breach notification laws which govern the collection, use, disclosure, and protection of health-related and other personal information, many of which differ from each other in significant ways and often are not pre-empted by HIPAA, thus requiring additional compliance efforts.

We may also be subject to federal and state consumer protection and unfair competition laws, which broadly regulate marketplace activities and activities that potentially harm consumers.

We have entered into consulting and scientific advisory board arrangements with physicians and other healthcare providers, some of which include provisions of stock options, including some who could influence the use of our product candidates, if approved. Because of the complex and far-reaching nature of these laws, regulatory agencies may view these transactions as prohibited arrangements that must be restructured, or discontinued, or for which we could be subject to other significant penalties. We could be adversely affected if regulatory agencies interpret our financial relationships with providers who may influence the ordering of and use our product candidates, if approved, to be in violation of applicable laws.

The scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of healthcare reform, especially in light of the lack of applicable precedent and regulations. Federal and state enforcement bodies have recently increased their scrutiny of interactions between healthcare companies and healthcare providers, which has led to a number of investigations, prosecutions, convictions and settlements in the healthcare industry. Responding to investigations can be time-and resource-consuming and can divert management's attention from the business. Any such investigation or settlement could increase our costs or otherwise have an adverse effect on our business.

Ensuring that our business arrangements with third parties comply with applicable healthcare laws and regulations will likely be costly. If our operations are found to be in violation of any of these laws or any other current or future governmental laws and regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, disgorgement, individual imprisonment, exclusion from government funded healthcare programs, such as Medicare and Medicaid, contractual damages, reputational harm, diminished profits and future earnings, additional reporting obligations and oversight if we become subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws, and the curtailment or restructuring of our operations, any of which could substantially disrupt our operations. If any of the physicians or other healthcare providers or entities with whom we expect to do business is found to be not in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

We are subject to certain U.S. and foreign anti-corruption, anti-money laundering, export control, sanctions, and other trade laws and regulations. We can face serious consequences for violations.

U.S. and foreign anti-corruption, anti-money laundering, export control, sanctions, and other trade laws and regulations, or collectively, Trade Laws, prohibit, among other things, companies and their employees, agents, clinical research organizations, legal counsel, accountants, consultants, contractors, and other partners from authorizing, promising, offering, providing, soliciting, or receiving directly or indirectly, corrupt or improper payments or anything else of value to or from recipients in the public or private sector. Violations of Trade Laws can result in substantial criminal fines and civil penalties, imprisonment, the loss of trade privileges, debarment, tax reassessments, breach of contract and fraud litigation, reputational harm, and other consequences. We have direct or indirect interactions with officials and employees of government agencies or government-affiliated hospitals, universities, and other organizations. We also expect our non-U.S. activities to increase over time. We expect to rely on third parties for research, preclinical studies, and clinical trials and/or to obtain necessary permits, licenses, patent registrations, and other marketing approvals. We can be held liable for the corrupt or other illegal activities of our personnel, agents, or partners, even if we do not explicitly authorize or have prior knowledge of such activities.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could have a material adverse effect on the success of our business.

We, and the third parties with whom we share our facilities, are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Each of our operations involve the use of hazardous and flammable materials, including chemicals and biological and radioactive materials. Each of our operations also produce hazardous waste products. 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. We could be held liable for any resulting damages in the event of contamination or injury resulting from the use of hazardous materials by us or the third parties with whom we share our facilities, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties.

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 maintain insurance for environmental liability or toxic tort claims that may be asserted against us in connection with our storage or disposal of biological, hazardous or radioactive materials.

In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research and development. Failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

Risks Related to Our Intellectual Property

If we are unable to obtain and maintain sufficient intellectual property protection for our product candidates, or if the scope of the intellectual property protection is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours, and our ability to successfully commercialize our products may be adversely affected.

Our success depends in large part on our ability to obtain and maintain patent protection in the United States and other countries with respect to our product candidates and research programs. We seek to protect our proprietary position by filing patent applications in the United States and abroad related to our novel discoveries and technologies that are important to our business. Our pending and future patent applications may not result in patents being issued which protect our product candidates or their intended uses or which effectively prevent others from commercializing competitive technologies, products or product candidates.

Obtaining and enforcing patents is expensive and time-consuming, and we may not be able to file and prosecute all necessary or desirable patent applications or maintain and/or enforce patents that may issue based on our patent applications, at a reasonable cost or in a timely manner. It is also possible that we will fail to identify patentable aspects of our research and development results before it is too late to obtain patent protection. Although we enter into non-disclosure and confidentiality agreements with parties who have access to patentable aspects of our research and development output, such as our employees, corporate collaborators, outside scientific collaborators, contract research organizations, contract manufacturers, consultants, advisors and other third parties, any of these parties may breach these agreements and disclose such results before a patent application is filed, thereby jeopardizing our ability to seek patent protection.

Composition of matter patents for biological and pharmaceutical products such as CAR-based product candidates often provide a strong form of intellectual property protection for those types of products, as such patents provide protection without regard to any method of use. We cannot be certain that the claims in our pending patent applications covering composition of matter of our product candidates will be considered patentable by the United States Patent and Trademark Office, or USPTO, or by patent offices in foreign countries, or that the claims in any of our issued patents will be considered valid and enforceable by courts in the United States or foreign countries. Method of use patents protect the use of a product for the specified method. This type of patent does not prevent a competitor from making and marketing a product that is identical to our product for an indication that is outside the scope of the patented method. Moreover, even if competitors do not actively promote their product for our targeted indications, physicians may prescribe these products “off-label.” Although off-label prescriptions may infringe or contribute to the infringement of method of use patents, the practice is common and such infringement is difficult to prevent or prosecute.

The patent position of biopharmaceutical companies generally is highly uncertain, involves complex legal and factual questions and has in recent years been the subject of much litigation, resulting in court decisions, including Supreme Court decisions, that have increased uncertainties as to the ability to enforce patent rights in the future. In addition, the laws of foreign countries may not protect our rights to the same extent as the laws of the United States, or vice versa.

Further, we may not be aware of all third-party intellectual property rights potentially relating to our product candidates or their intended uses, and as a result the impact of such third-party intellectual property rights upon the patentability of our own patents and patent applications, as well as the impact of such third-party intellectual property upon our freedom to operate, is highly uncertain. Patent applications in the United States and other jurisdictions are typically not published until 18 months after filing or, in some cases, not at all. Therefore, we cannot know with certainty whether we were the first to make the inventions claimed in our patents or pending patent applications, or that we were the first to file for patent protection of such inventions. As a result, the issuance, scope, validity, enforceability and commercial value of our patent rights are highly uncertain. Our patents or pending patent applications may be challenged in the courts or patent offices in the United States and abroad. For example, we may be subject to a third-party pre-issuance submission of prior art to the USPTO or

become involved in post-grant review procedures, oppositions, derivations, reexaminations, or inter partes review proceedings, in the United States or elsewhere, challenging our patent rights or the patent rights of others. An adverse determination in any such challenges may result in loss of exclusivity 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. In addition, 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. Any failure to obtain or maintain patent protection with respect to our product candidates could have a material adverse effect on our business, financial condition, results of operations and prospects.

We may not identify relevant third-party patents or may incorrectly interpret the relevance, scope or expiration of a third-party patent which might adversely affect our ability to develop and market our products.

We cannot guarantee that any of our patent searches or analyses, including the identification of relevant patents, the scope of patent claims or the expiration of relevant patents, are complete or thorough, nor can we be certain that we have identified each and every third-party patent and pending application in the United States and abroad that is relevant to or necessary for the commercialization of our product candidates in any jurisdiction.

The scope of a patent claim is determined by an interpretation of the law, the written disclosure in a patent and the patent's prosecution history. Our interpretation of the relevance or the scope of a patent or a pending application may be incorrect, which may negatively impact our ability to market our products. We may incorrectly determine that our products are not covered by a third-party patent or may incorrectly predict whether a third-party's pending application will issue with claims of relevant scope. Our determination of the expiration date of any patent in the United States or abroad that we consider relevant may be incorrect, which may negatively impact our ability to develop and market our product candidates. Our failure to identify and correctly interpret relevant patents may negatively impact our ability to develop and market our products.

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. If we fail to comply with our obligations under these agreements, or we are subject to a bankruptcy, the licensor may have the right to terminate the license, in which event we would not be able to market products covered by the license.

We may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates, and we have done so from time to time. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, if at all. In that event, we may be required to expend considerable time and resources to develop or license replacement technology. If we are unable to do so, we may be unable to develop or commercialize the affected product candidates, which could harm our business significantly. We cannot provide any assurances that third-party patents do not exist which might be enforced against our current product candidates or future products, resulting in either an injunction prohibiting our sales, or, with respect to our sales, an obligation on our part to pay royalties and/or other forms of compensation to third parties.

In many cases, patent prosecution of our licensed technology is controlled solely by the licensor. If our licensors fail to obtain and maintain patent or other protection for the proprietary intellectual property we license from them, we could lose our rights to the intellectual property or our exclusivity with respect to those rights,

these patents and applications may not be prosecuted and enforced in a manner consistent with the best interests of our business and our competitors could market competing products using the intellectual property. In certain 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. Licensing of intellectual property is of critical importance to our business and involves complex legal, business and scientific issues and is complicated by the rapid pace of scientific discovery in our industry. Disputes may arise regarding intellectual property subject to a licensing agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing 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 partners; and
- the priority of invention of patented technology.

If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates. We are generally also subject to all of the same risks with respect to protection of intellectual property that we license as we are for intellectual property that we own, which are described herein. If we or our licensor fail to adequately protect this intellectual property, our ability to commercialize products could suffer.

In the future, we may need to obtain additional licenses of third-party technology that may not be available to us or are available only on commercially unreasonable terms, and which may cause us to operate our business in a more costly or otherwise adverse manner that was not anticipated.

We currently have rights to intellectual property, covering our product candidates and other proprietary technologies. Other pharmaceutical companies and academic institutions may also have filed or are planning to file patent applications potentially relevant to our business. From time to time, in order to avoid infringing these third-party patents, we may be required to license technology from additional third parties to further develop or commercialize our product candidates. Should we be required to obtain licenses to any third-party technology, including any such patents required to manufacture, use or sell our product candidates, such licenses may not be available to us on commercially reasonable terms, or at all. The inability to obtain any third-party license required to develop or commercialize any of our product candidates could cause us to abandon any related efforts, which could seriously harm our business and operations.

The licensing or acquisition of third-party intellectual property rights is a competitive area, and several more established companies may pursue strategies to license or acquire third-party intellectual property rights we may consider attractive or necessary. These established companies may have a competitive advantage over us due to their size, capital resources and greater clinical development and commercialization capabilities. In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us.

Moreover, some of our owned and in-licensed patents or patent applications or future patents are or may be co-owned with third parties. If we are unable to obtain an exclusive license to any such third-party co-owners' interest in such patents or patent applications, such co-owners may be able to license their rights to other third parties, including our competitors, and our competitors could market competing products and technology. In addition, we may need the cooperation of any such co-owners of our patents in order to enforce such patents

against third parties, and such cooperation may not be provided to us. Furthermore, our owned and in-licensed patents may be subject to a reservation of rights by one or more third parties. Any of the foregoing could have a material adverse effect on our competitive position, business, financial conditions, results of operations and prospects.

We cannot ensure that patent rights relating to inventions described and claimed in our pending patent applications will issue or that patents based on our patent applications will not be challenged and rendered invalid and/or unenforceable.

We have pending U.S. and foreign patent applications in our portfolio; however, we cannot predict:

- if and when patents may issue based on our patent applications;
- the scope of protection of any patent issuing based on our patent applications;
- whether the claims of any patent issuing based on our patent applications will provide protection against competitors,
- whether or not third parties will find ways to invalidate or circumvent our patent rights;
- whether or not others will obtain patents claiming aspects similar to those covered by our patents and patent applications;
- whether we will need to initiate litigation or administrative proceedings to enforce and/or defend our patent rights which will be costly whether we win or lose; and/or
- whether the patent applications that we own, or in-license will result in issued patents with claims that cover our product candidates or uses thereof in the United States or in other foreign countries.

We cannot be certain that the claims in our pending patent applications directed to our product candidates and/or technologies will be considered patentable by the USPTO or by patent offices in foreign countries. There can be no assurance that any such patent applications will issue as granted patents. One aspect of the determination of patentability of our inventions depends on the scope and content of the "prior art," information that was or is deemed available to a person of skill in the relevant art prior to the priority date of the claimed invention. There may be prior art of which we are not aware that may affect the patentability of our patent claims or, if issued, affect the validity or enforceability of a patent claim. Even if the patents do issue based on our patent applications, third parties may challenge the validity, enforceability or scope thereof, which may result in such patents being narrowed, invalidated or held unenforceable. Furthermore, even if they are unchallenged, patents in our portfolio may not adequately exclude third parties from practicing relevant technology or prevent others from designing around our claims. If the breadth or strength of our intellectual property position with respect to our product candidates is threatened, it could dissuade companies from collaborating with us to develop and threaten our ability to commercialize our product candidates. In the event of litigation or administrative proceedings, we cannot be certain that the claims in any of our issued patents will be considered valid by courts in the United States or foreign countries.

Intellectual property rights do not necessarily address all potential threats to our competitive advantage.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations and may not adequately protect our business or permit us to maintain our competitive advantage. For example:

- others may be able to make product candidates that are similar to ours but that are not covered by the claims of the patents that we own or have exclusively licensed;
- we or our licensors or future collaborators might not have been the first to make the inventions covered by the issued patent or pending patent application that we own or have exclusively licensed;

- we or our licensors or future collaborators might not have been the first to file patent applications covering certain of our inventions;
- others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our intellectual property rights;
- it is possible that our pending patent applications will not lead to issued patents;
- issued patents that we own or have exclusively licensed may be held invalid or unenforceable, as a result of legal challenges by our competitors;
- our competitors might conduct research and development activities in countries where we do not have patent rights and then use the information learned from such activities to develop competitive products for sale in our major commercial markets;
- we may not develop additional proprietary technologies that are patentable;
- we cannot predict the scope of protection of any patent issuing based on our patent applications, including whether the patent applications that we own or in-license will result in issued patents with claims that cover our product candidates or uses thereof in the United States or in other foreign countries;
- the claims of any patent issuing based on our patent applications may not provide protection against competitors or any competitive advantages, or may be challenged by third parties;
- if enforced, a court may not hold that our patents are valid, enforceable and infringed;
- we may need to initiate litigation or administrative proceedings to enforce and/or defend our patent rights which will be costly whether we win or lose;
- we may choose not to file a patent in order to maintain certain trade secrets or know-how, and a third party may subsequently file a patent covering such intellectual property;
- we may fail to adequately protect and police our trademarks and trade secrets; and
- the patents of others may have an adverse effect on our business, including if others obtain patents claiming subject matter similar to or improving that covered by our patents and patent applications.

Should any of these events occur, they could significantly harm our business, results of operations and prospects.

If we are sued for infringing intellectual property rights of third parties, such litigation could be costly and time consuming and could prevent or delay us from developing or commercializing our product candidates.

Our commercial success depends, in part, on our ability to develop, manufacture, market and sell our product candidates without infringing the intellectual property and other proprietary rights of third parties. Third parties may allege that we have infringed or misappropriated their intellectual property. Litigation or other legal proceedings relating to intellectual property claims, with or without merit, is unpredictable and generally expensive and time consuming and, even if resolved in our favor, is likely to divert significant resources from our core business, including distracting our technical and management personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the market price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing or distribution activities. We may not have sufficient financial or other resources to adequately conduct such litigation or proceedings. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources and more mature and developed intellectual property portfolios. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have a material adverse effect on our ability to compete in the marketplace.

There is a substantial amount of intellectual property litigation in the biotechnology and pharmaceutical industries, and we may become party to, or threatened with, litigation or other adversarial proceedings regarding intellectual property rights with respect to our products candidates. We cannot assure you that our product candidates and other proprietary technologies we may develop will not infringe existing or future patents owned by third parities. Third parties may assert infringement claims against us based on existing or future intellectual property rights. We may not be aware of patents that have already been issued and that a third party, for example, a competitor in the fields in which we are developing our product candidates, might assert are infringed by our current or future product candidates, including claims to compositions, formulations, methods of manufacture or methods of use or treatment that cover our product candidates. It is also possible that patents owned by third parties of which we are aware, but which we do not believe are relevant to our product candidates and other proprietary technologies we may develop, could be found to be infringed by our product candidate. In addition, because patent applications can take many years to issue, there may be currently pending patent applications that may later result in issued patents that our product candidates may infringe. Our competitors in both the United States and abroad, many of which have substantially greater resources and have made substantial investments in patent portfolios and competing technologies, may have applied for or obtained or may in the future apply for and obtain, patents that will prevent, limit or otherwise interfere with our ability to make, use and sell our product candidates. The pharmaceutical and biotechnology industries have produced a considerable number of patents, and it may not always be clear to industry participants, including us, which patents cover various types of products or methods of use. The coverage of patents is subject to interpretation by the courts, and the interpretation is not always uniform. If we were sued for patent infringement, we would need to demonstrate that our product candidates, products or methods either do not infringe the patent claims of the relevant patent or that the patent claims are invalid or unenforceable, and we may not be able to do this. Proving invalidity may be difficult. For example, in the United States, proving invalidity in court requires a showing of clear and convincing evidence to overcome the presumption of validity enjoyed by issued patents, and there is no assurance that a court of competent jurisdiction would invalidate the claims of any such U.S. patent. Even if we are successful in these proceedings, we may incur substantial costs and the time and attention of our management and scientific personnel could be diverted in pursuing these proceedings, which could have a material adverse effect on our business and operations. In addition, we may not have sufficient resources to bring these actions to a successful conclusion.

If we are found to infringe a third-party's intellectual property rights, we could be forced, including by court order, to cease developing, manufacturing or commercializing the infringing product candidate or product. Alternatively, we may be required to obtain a license from such third-party in order to use the infringing technology and continue developing, manufacturing or marketing the infringing product candidate. However, we may not be able to obtain any required license on commercially reasonable terms or at all. Even if we were able to obtain a license, it could be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. In addition, we could be found liable for monetary damages, including treble damages and attorneys' fees if we are found to have willfully infringed a patent. A finding of infringement could prevent us from commercializing our product candidates or force us to cease some of our business operations, and could divert the time and attention of our technical personnel and management, cause development delays, and/or require us to develop non-infringing technology, which may not be possible on a cost-effective basis, any of which could materially harm our business. In the event of a successful claim of infringement against us, we may have to pay substantial monetary damages, including treble damages and attorneys' fees for willful infringement, pay royalties and other fees, redesign our infringing drug or obtain one or more licenses from third parties, which may be impossible or require substantial time and monetary expenditure. Claims that we have misappropriated the confidential information or trade secrets of third parties could have a similar negative impact on our business.

We may become involved in lawsuits to protect or enforce our patents or other intellectual property, which could be expensive, time consuming and unsuccessful.

Competitors or other third parties may infringe our patents, trademarks, copyrights or other intellectual property. To counter infringement or unauthorized use, we may be required to file infringement claims, which

can be expensive and time consuming and divert the time and attention of our management and scientific personnel. Our pending patent applications cannot be enforced against third parties practicing the technology claimed in such applications unless and until a patent issues from such applications. Any claims we assert against perceived infringers could provoke these parties to assert counterclaims against us alleging that we infringe their patents, in addition to counterclaims asserting that our patents are invalid or unenforceable, or both. In patent litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness, non-enablement or insufficient written description. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the USPTO or made a misleading statement during prosecution. The outcome following legal assertions of invalidity and unenforceability is unpredictable. In any patent infringement proceeding, there is a risk that a court will decide that a patent of ours is invalid or unenforceable, in whole or in part, and that we do not have the right to stop the other party from using the invention at issue. There is also a risk that, even if the validity of such patents is upheld, the court will construe the patent's claims narrowly or decide that we do not have the right to stop the other party from using the invention at issue on the grounds that our patent claims do not cover the invention, or decide that the other party's use of our patented technology falls under the safe harbor to patent infringement under 35 U.S.C. §271(e)(1). An adverse outcome in a litigation or proceeding involving our patents could limit our ability to assert our patents against those parties or other competitors and may curtail or preclude our ability to exclude third parties from making and selling similar or competitive products. Any of these occurrences could adversely affect our competitive business position, business prospects and financial condition. Similarly, if we assert trademark infringement claims, a court may determine that the marks we have asserted are invalid or unenforceable, or that the party against whom we have asserted trademark infringement has superior rights to the marks in question. In this case, we could ultimately be forced to cease use of such trademarks.

Even if we establish infringement, the court may decide not to grant an injunction against further infringing activity and instead award only monetary damages, which may or may not be an adequate remedy. Furthermore, 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 litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of shares of our common stock. Moreover, we cannot assure you that we will have sufficient financial or other resources to file and pursue such infringement claims, which typically last for years before they are concluded. Even if we ultimately prevail in such claims, the monetary cost of such litigation and the diversion of the attention of our management and scientific personnel could outweigh any benefit we receive as a result of the proceedings.

Because of the expense and uncertainty of litigation, we may not be in a position to enforce our intellectual property rights against third parties.

Because of the expense and uncertainty of litigation, we may conclude that even if a third-party is infringing our issued patent, any patents that may be issued as a result of our pending or future patent applications or other intellectual property rights, the risk-adjusted cost of bringing and enforcing such a claim or action may be too high or not in the best interest of our company or our stockholders, or it may be otherwise impractical or undesirable to enforce our intellectual property against some third parties. Our competitors or other third parties may be able to sustain the costs of complex patent litigation or proceedings more effectively than we can because of their greater financial resources and more mature and developed intellectual property portfolios. In such cases, we may decide that the more prudent course of action is to simply monitor the situation or initiate or seek some other non-litigious action or solution. In addition, the uncertainties associated with litigation could compromise our ability to raise the funds necessary to continue our clinical trials, continue our internal research programs, in-license needed technology or other product candidates, or enter into development partnerships that would help us bring our product candidates to market.

We may be subject to claims that our employees, consultants or independent contractors have wrongfully used or disclosed confidential information of third parties.

We could in the future be subject to claims that we or our employees have inadvertently or otherwise used or disclosed alleged trade secrets or other confidential information of former employers or competitors. Although we try to ensure that our employees and consultants do not use the intellectual property, proprietary information, know-how or trade secrets of others in their work for us, we may become subject to claims that we caused an employee to breach the terms of his or her non-competition or non-solicitation agreement, or that we or these individuals have, inadvertently or otherwise, used or disclosed the alleged trade secrets or other proprietary information of a former employer or competitor.

While we may litigate to defend ourselves against these claims, even if we are successful, litigation could result in substantial costs and could be a distraction to management. If our defenses to these claims fail, in addition to requiring us to pay monetary damages, a court could prohibit us from using technologies or features that are essential to our product candidates, if such technologies or features are found to incorporate or be derived from the trade secrets or other proprietary information of the former employers. Moreover, any such litigation or the threat thereof may adversely affect our reputation, our ability to form strategic alliances or sublicense our rights to collaborators, engage with scientific advisors or hire employees or consultants, each of which would have an adverse effect on our business, results of operations and financial condition. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management.

We may not be able to protect our intellectual property rights throughout the world.

Patents are of national or regional effect, and filing, prosecuting and defending patents on all of our product candidates throughout the world would be prohibitively expensive. As such, our intellectual property rights in some countries outside the United States can be less extensive than those in the United States and 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. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products or technology and may export otherwise infringing products or technology to territories where we have patent protection, but enforcement rights are not as strong as those in the United States. These products may compete with our products, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing. Further, the legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property protection, particularly those relating to pharmaceuticals or biologics, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights generally. 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, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing and could provoke third parties to assert claims against us. We may not prevail in any such lawsuits that we initiate and the damages and other remedies awarded, if any, may not be commercially meaningful. Similarly, if our trade secrets are disclosed in a foreign jurisdiction, competitors worldwide could have access to our proprietary information and we may be without satisfactory recourse. Such disclosure could have a material adverse effect on our business. Moreover, our ability to protect and enforce our intellectual property rights may be adversely affected by unforeseen changes in foreign intellectual property laws. In addition, certain developing countries, including China and India, have compulsory licensing laws under which a patent owner may be compelled to grant licenses to third parties. 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. In addition, many countries limit the enforceability of patents against government agencies or government contractors. This could limit our potential revenue opportunities. 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.

Changes in patent law in the United States and other jurisdictions could diminish the value of patents in general, thereby impairing our ability to protect our product candidates.

As is the case with other biopharmaceutical companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biopharmaceutical industry involves both technological and legal complexity and is therefore costly, time consuming and inherently uncertain. Changes in either the patent laws or interpretation of the patent laws in the United States could increase the uncertainties and costs, and may diminish our ability to protect our inventions, obtain, maintain, and enforce our intellectual property rights and, more generally, could affect the value of our intellectual property or narrow the scope of our owned and licensed patents. Recent patent reform legislation in the United States and other countries, including the Leahy-Smith America Invents Act, or the Leahy-Smith Act, signed into law on September 16, 2011, could increase those uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents. The Leahy-Smith Act includes a number of significant changes to U.S. patent law. These include provisions that affect the way patent applications are prosecuted, redefine prior art and provide more efficient and cost-effective avenues for competitors to challenge the validity of patents. These include allowing third-party submission of prior art to the USPTO during patent prosecution and additional procedures to attack the validity of a patent by USPTO administered post-grant proceedings, including post-grant review, *inter partes* review, and derivation proceedings. After March 2013, under the Leahy-Smith Act, the United States transitioned to a first inventor to file system in which, assuming that the other statutory requirements are met, the first inventor to file a patent application will be entitled to the patent on an invention regardless of whether a third-party was the first to invent the claimed invention. A third party that files a patent application in the USPTO after March 2013, but before we file an application covering the same invention, could therefore be awarded a patent covering an invention of ours even if we had made the invention before it was made by such third party. This will require us to be cognizant going forward of the time from invention to filing of a patent application. Since patent applications in the United States and most other countries are confidential for a period of time after filing or until issuance, we cannot be certain that we or our licensors were the first to either (i) file any patent application related to our product candidates and other proprietary technologies we may develop or (ii) invent any of the inventions claimed in our or our licensor's patents or patent applications. Even where we have a valid and enforceable patent, we may not be able to exclude others from practicing the claimed invention where the other party can show that they used the invention in commerce before our filing date or the other party benefits from a compulsory license. However, the Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business, financial condition, results of operations and prospects.

In addition, the patent positions of companies in the development and commercialization of pharmaceuticals are particularly uncertain. The U.S. 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. Depending on future actions by the U.S. Congress, the U.S. courts, the USPTO and the relevant law-making bodies in other countries, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future. For example, in the 2013 case *Assoc. for Molecular Pathology v. Myriad Genetics, Inc.*, the U.S. Supreme Court held that certain claims to DNA molecules are not patentable. While we do not believe that any of the patents owned or licensed by us will be found invalid based on this decision, we cannot predict how future decisions by the courts, the U.S. Congress or the USPTO may impact the value of our patents.

Obtaining and maintaining patent protection depends on compliance with various procedural, document submissions, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

Periodic maintenance fees, renewal fees, annuities fees and various other governmental fees on patents and/or patent applications are due to be paid to the USPTO and foreign patent agencies in several stages over the

lifetime of the patent and/or patent application. The USPTO and various foreign governmental patent agencies also require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. While an inadvertent lapse can in many cases be cured by payment of a late fee or by other means in accordance with the applicable rules, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. Non-compliance events that could result in abandonment or lapse of a patent or patent application include, but are not limited to, failure to respond to official actions within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents. If we fail to maintain the patents and patent applications covering our product candidates, our competitive position would be adversely affected.

We may rely on trade secret and proprietary know-how which can be difficult to trace and enforce and, if we are unable to protect the confidentiality of our trade secrets, our business and competitive position would be harmed.

In addition to seeking patents for some of our technology and product candidates, we may also rely on trade secrets, including unpatented know-how, technology and other proprietary information, to maintain our competitive position. Elements of our product candidate, including processes for their preparation and manufacture, may involve proprietary know-how, information, or technology that is not covered by patents, and thus for these aspects we may consider trade secrets and know-how to be our primary intellectual property. Any disclosure, either intentional or unintentional, by our employees, the employees of third parties with whom we share our facilities or third-party consultants and vendors that we engage to perform research, clinical trials or manufacturing activities, or misappropriation by third parties (such as through a cybersecurity breach) of our trade secrets or proprietary information could enable competitors to duplicate or surpass our technological achievements, thus eroding our competitive position in our market. Because we expect to rely on third parties in the development and manufacture of our product candidates, we must, at times, share trade secrets with them. Our reliance on third parties requires us to share our trade secrets, which increases the possibility that a competitor will discover them or that our trade secrets will be misappropriated or disclosed.

Trade secrets and know-how can be difficult to protect. We require our employees to enter into written employment agreements containing provisions of confidentiality and obligations to assign to us any inventions generated in the course of their employment. We and any third parties with whom we share facilities enter into written agreements that include confidentiality and intellectual property obligations to protect each party's property, potential trade secrets, proprietary know-how, and information. We further seek to protect our potential trade secrets, proprietary know-how, and information in part, by entering into non-disclosure and confidentiality agreements with parties who are given access to them, such as our corporate collaborators, outside scientific collaborators, contract research organizations, contract manufacturers, consultants, advisors and other third parties. With our consultants, contractors, and outside scientific collaborators, these agreements typically include invention assignment obligations. We cannot guarantee that we have entered into such agreements with each party that may have or has had access to our trade secrets or proprietary technology and processes. We cannot be certain that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. Despite these efforts, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, some courts inside and outside the United States are less willing or unwilling to protect trade secrets. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor or other third-party, we would have no right to prevent them from using that technology or information to compete with us. If any of our trade secrets were to be disclosed to or independently developed by a competitor or other third-party, our competitive position would be harmed.

We may become subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

We may be subject to claims that former employees, collaborators or other third parties have an interest in our patents or other intellectual property as an inventor or co-inventor. The failure to name the proper inventors on a patent application can result in the patents issuing thereon being unenforceable. Inventorship disputes may arise from conflicting views regarding the contributions of different individuals named as inventors, the effects of foreign laws where foreign nationals are involved in the development of the subject matter of the patent, conflicting obligations of third parties involved in developing our product candidates or as a result of questions regarding co-ownership of potential joint inventions. Litigation may be necessary to resolve these and other claims challenging inventorship and/or ownership. Alternatively, or additionally, we may enter into agreements to clarify the scope of our rights in such intellectual property. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, valuable intellectual property. Such an outcome could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees.

Our licensors may have relied on third-party consultants or collaborators or on funds from third parties, such as the U.S. government, such that our licensors are not the sole and exclusive owners of the patents we in-licensed. If other third parties have ownership rights or other rights to our in-licensed patents, they may be able to license such patents to our competitors, and our competitors could market competing products and technology. This could have a material adverse effect on our competitive position, business, financial conditions, results of operations, and prospects.

In addition, while it is our policy to require our employees and contractors who may be involved in the conception or development of intellectual property to execute agreements assigning such intellectual property to us, 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. The assignment of intellectual property rights may not be self-executing, or the assignment agreements may be breached, and we may be forced to bring claims against third parties, or defend claims that they may bring against us, to determine the ownership of what we regard as our intellectual property. Such claims could have a material adverse effect on our business, financial condition, results of operations, and prospects.

Patent terms may be inadequate to protect our competitive position on our product candidates for an adequate amount of time.

Patent rights are of limited duration. In the United States, if all maintenance fees are paid timely, the natural expiration of a patent is generally 20 years after its first effective filing date. 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 product candidates are commercialized. Even if patents covering our product candidates are obtained, once the patent life has expired for a product, we may be open to competition from biosimilar or generic products. As a result, our patent portfolio may not provide us with sufficient rights to exclude others from commercializing product candidates similar or identical to ours. Upon issuance in the United States, a patent's life can be increased based on certain delays caused by the USPTO, but this increase can be reduced or eliminated based on certain delays caused by the patent applicant during patent prosecution. A patent term extension based on regulatory delay may be available in the United States. However, only a single patent can be extended for each marketing approval, and any patent can be extended only once, for a single product. Moreover, the scope of protection during the period of the patent term extension does not extend to the full scope of the claim, but instead only to the scope of the product as approved. Laws governing analogous patent term extensions in foreign jurisdictions vary widely, as do laws governing the ability to obtain multiple patents from a single patent family. Additionally, we may not receive an extension if we fail to exercise due diligence during the testing phase or regulatory review process, apply within applicable deadlines, fail to apply prior to expiration of

relevant patents or otherwise fail to satisfy applicable requirements. If we are unable to obtain patent term extension or restoration, or the term of any such extension is less than we request, the period during which we will have the right to exclusively market our product will be shortened and our competitors may obtain approval of competing products following our patent expiration and may take advantage of our investment in development and clinical trials by referencing our clinical and preclinical data to launch their product earlier than might otherwise be the case, and our revenue could be reduced, possibly materially.

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.

Our current or future trademarks or trade names may be challenged, infringed, circumvented or declared generic or descriptive determined to be infringing on other marks. We may not be able to protect our rights to these trademarks and trade names or may be forced to stop using these names, which we need for name recognition by potential partners or customers in our markets of interest. During trademark registration proceedings, we may receive rejections of our applications by the USPTO or in other foreign jurisdictions. Although we would be given an opportunity to respond to those rejections, we may be unable to overcome such rejections. In addition, in the USPTO and in comparable agencies in many foreign jurisdictions, third parties are given an opportunity to oppose pending trademark applications and to seek to cancel registered trademarks. Opposition or cancellation proceedings may be filed against our trademarks, and our trademarks may not survive such proceedings. If we are unable to establish name recognition based on our trademarks and trade names, we may not be able to compete effectively and our business may be adversely affected. We may license our trademarks and trade names to third parties, such as distributors. Though these license agreements may provide guidelines for how our trademarks and trade names may be used, a breach of these agreements or misuse of our trademarks and tradenames by our licensees may jeopardize our rights in or diminish the goodwill associated with our trademarks and trade names.

Moreover, any name we have proposed to use with our product candidate in the United States must be approved by the FDA, regardless of whether we have registered it, or applied to register it, as a trademark. Similar requirements exist in Europe. The FDA typically conducts a review of proposed product names, including an evaluation of potential for confusion with other product names. If the FDA (or an equivalent administrative body in a foreign jurisdiction) objects to any of our proposed proprietary product names, it may be required to expend significant additional resources in an effort to identify a suitable substitute name that would qualify under applicable trademark laws, not infringe the existing rights of third parties and be acceptable to the FDA. Furthermore, in many countries, owning and maintaining a trademark registration may not provide an adequate defense against a subsequent infringement claim asserted by the owner of a senior trademark. At times, competitors or other third parties 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 registered or unregistered trademarks or trade names. If we assert trademark infringement claims, a court may determine that the marks we have asserted are invalid or unenforceable, or that the party against whom we have asserted trademark infringement has superior rights to the marks in question. In this case, we could ultimately be forced to cease use of such trademarks.

Risks Related to Our Common Stock and this Offering

There has been no prior public market for our common stock, the stock price of our common stock may be volatile or may decline regardless of our operating performance and you may not be able to resell your shares at or above the initial public offering price.

There has been no public market for our common stock prior to this offering. The initial public offering price for our common stock will be determined through negotiations between the underwriters and us and may vary from the market price of our common stock following this offering. If you purchase shares of our common

stock in this offering, you may not be able to resell those shares at or above the initial public offering price. An active or liquid market in our common stock may not develop upon the completion of this offering or, if it does develop, it may not be sustainable. The market price of our common stock may fluctuate significantly in response to numerous factors, many of which are beyond our control, including:

- overall performance of the equity markets;
- our operating performance and the performance of other similar companies;
- the published opinions and third-party valuations by banking and market analysts;
- results from our ongoing clinical trials and future clinical trials with our current and future product candidates or of our competitors;
- changes in our projected operating results that we provide to the public, our failure to meet these projections or changes in recommendations by securities analysts that elect to follow our common stock;
- regulatory or legal developments in the United States and other countries;
- the level of expenses related to future product candidates or clinical development programs;
- our failure to achieve product development goals in the timeframe we announce;
- announcements of acquisitions, strategic alliances or significant agreements by us or by our competitors;
- recruitment or departure of key personnel;
- the economy as a whole and market conditions in our industry;
- trading activity by a limited number of stockholders who together beneficially own a majority of our outstanding common stock;
- the expiration of market standoff or contractual lock-up agreements;
- the size of our market float; and
- any other factors discussed in this prospectus.

In addition, the stock markets have experienced extreme price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many immuno-oncology companies. Stock prices of many immuno-oncology companies have fluctuated in a manner unrelated or disproportionate to the operating performance of those companies. In the past, stockholders have filed securities class action litigation following periods of market volatility. If we were to become involved in securities litigation, it could subject us to substantial costs, divert resources and the attention of management from our business and adversely affect our business.

Our principal stockholders and management own a significant percentage of our stock and will be able to exert significant control over matters subject to stockholder approval.

As of September 30, 2018, our executive officers, directors, five percent stockholders and their affiliates beneficially own approximately 76.4% of our voting stock and, upon closing of this offering, that same group will beneficially own approximately % of our outstanding voting stock. Therefore, even after this offering, these stockholders will have the ability to influence us through their ownership positions. These stockholders may be able to determine all matters requiring stockholder approval. For example, these stockholders, acting together, may be able to control elections of directors, amendments of our organizational documents, or approval of any merger, sale of assets, or other major corporate transaction. This may prevent or discourage unsolicited acquisition proposals or offers for our common stock that you may believe are in your best interest as one of our stockholders.

In addition, Dr. Ostertag, our Chief Executive Officer, a member of our board of directors and the beneficial owner of approximately 35.7% of our voting stock as of September 30, 2018, is also a member of the board of directors of Transposagen and Hera and beneficially owns 69.3% and 45.5% of Transposagen's and Hera's capital stock on a fully-diluted basis, respectively. As a result, the interests of Dr. Ostertag may not be aligned with the interests of you and our other stockholders with respect to our relationships with Transposagen and Hera, and he may from time to time be incentivized to take certain actions that benefit his interests in those other entities and that you and our other stockholders do not view as being in your interest as investors in our company.

Substantial amounts of our outstanding shares may be sold into the market when lock-up or market standoff periods end. If there are substantial sales of shares of our common stock, the price of our common stock could decline.

The price of our common stock could decline if there are substantial sales of our common stock, particularly sales by our directors, executive officers and significant stockholders, or if there is a large number of shares of our common stock available for sale and the market perceives that sales will occur. After this offering, we will have outstanding shares of our common stock, based on the number of shares outstanding as of September 30, 2018. All of the shares of common stock sold in this offering will be available for sale in the public market. Substantially all of our outstanding shares of common stock are currently restricted from resale as a result of market standoff and lock-up agreements, as more fully described in the section titled "Shares Eligible for Future Sale." These shares will become available to be sold 181 days after the date of this prospectus, in addition to shares issuable pursuant to outstanding option and warrants. Shares held by directors, executive officers and other affiliates will be subject to volume limitations under Rule 144 under the Securities Act of 1933, as amended, or the Securities Act, and various vesting agreements.

After our initial public offering, certain of our stockholders will have rights, subject to some 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 our stockholders, subject to market standoff and lockup agreements. We also intend to register shares of common stock that we have issued and may issue under our employee equity incentive plans. Once we register these shares, they will be able to be sold freely in the public market upon issuance, subject to existing market standoff or lock-up agreements.

Citigroup Global Markets Inc. and Credit Suisse Securities (USA) LLC may, in their discretion, permit our stockholders to sell shares prior to the expiration of the restrictive provisions contained in those lock-up agreements.

The market price of the shares of our common stock could decline as a result of the sale of a substantial number of our shares of common stock in the public market or the perception in the market that the holders of a large number of shares intend to sell their shares.

If you purchase shares of our common stock in this offering, you will experience substantial and immediate dilution.

If you purchase shares of our common stock in this offering, you will experience substantial and immediate dilution in the pro forma net tangible book value per share of $ per share as of September 30, 2018, based on an assumed initial public offering price of our common stock of $ per share, which is the midpoint of the estimated price range set forth on the cover page of this prospectus, because the price that you pay will be substantially greater than the pro forma net tangible book value per share of the common stock that you acquire. This dilution is due in large part to the fact that our earlier investors paid substantially less than the initial public offering price when they purchased their shares of our capital stock. You will experience additional dilution upon exercise of options to purchase common stock under our equity incentive plans, upon vesting of options to purchase common stock under our equity incentive plans, if we issue restricted stock to our employees under our equity incentive plans or if we otherwise issue additional shares of our common stock.

Future sales and issuances of our common stock or rights to purchase common stock, including pursuant to our equity incentive plans, could result in additional dilution of the percentage ownership of our stockholders and could cause our stock price to fall.

Additional capital will be needed in the future to continue our planned operations. To the extent we raise additional capital by issuing equity securities, our stockholders may experience substantial dilution. We may sell common stock, convertible securities or other equity securities in one or more transactions at prices and in a manner, we determine from time to time. If we sell common stock, convertible securities or other equity securities in more than one transaction, investors may be materially diluted by subsequent sales. These sales may also result in material dilution to our existing stockholders, and new investors could gain rights superior to our existing stockholders.

Pursuant to our 2018 Equity Incentive Plan, or the 2018 Plan, our management is authorized to grant stock options and other equity-based awards to our employees, directors and consultants. The number of shares of our common stock reserved for issuance under our 2018 Plan will automatically increase on January 1 of each calendar year, starting on January 1, 2019 (assuming the 2018 Plan becomes effective in 2018) through January 1, 2028, in an amount equal to % of the total number of shares of our capital stock outstanding on the last day of the calendar month before the date of each automatic increase, or a lesser number of shares determined by our board of directors. If our board of directors elects to increase the number of shares available for future grant by the maximum amount each year, our stockholders may experience additional dilution, which could cause our stock price to fall.

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 pharmaceutical 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

We will have broad discretion in the use of the net proceeds of this offering and may not use them effectively or in ways that increase the value of our share price.

We cannot specify with any certainty the particular uses of the net proceeds that we will receive from this offering, but we currently expect such uses will include advancing our clinical product candidates into later-stage clinical trials and combination trials, advancing our research product candidates into clinical development, supporting our ongoing drug discovery efforts and supporting our growing infrastructure and needs in operating as a public company. We will have broad discretion in the application of the net proceeds, including working capital and other general corporate purposes, and you and other stockholders may disagree with how we spend or invest these proceeds. The failure by our management to apply these funds effectively could adversely affect our business and financial condition. Pending their use, we may invest the net proceeds from our initial public offering in a manner that does not produce income or that loses value. These investments may not yield a favorable return to our investors.

If securities or industry analysts do not publish research or publish inaccurate or unfavorable research about our business, our stock price and trading volume could decline.

The trading market for our common stock will depend in part on the research and reports that securities or industry analysts publish about us or our business. Securities and industry analysts do not currently, and may never, publish research on our company. If no or only very few securities analysts commence coverage of us, or if industry analysts cease coverage of us, the trading price for our common stock would be negatively affected. If one or more of the analysts who cover us downgrade our common stock or publish inaccurate or unfavorable research about our business, our common stock price would likely decline. If one or more of these analysts cease

coverage of us or fail to publish reports on us regularly, demand for our common stock could decrease, which might cause our common stock price and trading volume to decline.

Requirements associated with being a public company will increase our costs significantly, as well as divert significant company resources and management attention.

After the completion of this offering, we will be subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or the other rules and regulations of the SEC or any securities exchange relating to public companies. Compliance with the various reporting and other requirements applicable to public companies requires considerable time and attention of management. We cannot assure you that we will satisfy our obligations as a public company on a timely basis.

In addition, as a public company, it may be more difficult or more costly for us to obtain certain types of insurance, including directors' and officers' liability insurance, and we may be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. The impact of these events could also make it more difficult for us to attract and retain qualified personnel to serve on our board of directors, our board committees or as executive officers.

We have identified material weaknesses in our internal control over financial reporting. If our remediation of the material weaknesses is not effective, or if we experience additional material weaknesses in the future or otherwise fail to maintain an effective system of internal controls in the future, we may not be able to accurately or timely report our financial condition or results of operations, which may adversely affect investor confidence in us and, as a result, the value of our common stock.

After the completion of this offering, we will be subject to the reporting requirements of the Exchange Act, the Sarbanes-Oxley Act and the rules and regulations of the Nasdaq Stock Market. The Sarbanes-Oxley Act requires, among other things, that we maintain effective disclosure controls and procedures and internal controls over financial reporting. Prior to the completion of this offering, we have been a private company with limited accounting personnel to adequately execute our accounting processes and other supervisory resources with which to address our internal control over financial reporting and, as a result, we may experience difficulty in meeting these reporting requirements in a timely manner. To date, we have never conducted a review of our internal control for the purpose of providing the reports required by the Sarbanes-Oxley Act. During our review and testing, we may identify deficiencies and be unable to remediate them before we must provide the required reports.

In connection with the preparation of our 2017 consolidated financial statements, we identified material weaknesses in our internal control over financial reporting. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of our annual or interim consolidated financial statements will not be prevented or detected on a timely basis. These material weaknesses related to a lack of a sufficient complement of accounting resources, which led to our inability to maintain segregation of duties between the creation and posting of journal entries and review of account reconciliations. These material weaknesses did not result in a misstatement to our consolidated financial statements.

As the hiring of additional accounting personnel becomes economically feasible, we intend to take appropriate and reasonable steps to remediate these material weaknesses through the implementation of appropriate segregation of duties. However, we cannot assure you that these measures will significantly improve or remediate the material weaknesses described above.

We may discover additional weaknesses in our system of internal financial and accounting controls and procedures that could result in a material misstatement of our consolidated financial statements. Our internal control over financial reporting will not prevent or detect all errors and all fraud. A control system, no matter

how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud will be detected.

If we are not able to comply with the requirements of Section 404 of the Sarbanes-Oxley Act in a timely manner, or if we are unable to maintain proper and effective internal controls over financial reporting, we may not be able to produce timely and accurate financial statements. If that were to happen, our investors could lose confidence in our reported financial information, the market price of our stock could decline, and we could be subject to sanctions or investigations by the SEC or other regulatory authorities.

Our disclosure controls and procedures may not prevent or detect all errors or acts of fraud.

Upon the completion of this offering, we will become subject to the periodic reporting requirements of the Exchange Act. We designed our disclosure controls and procedures to reasonably assure that information we must disclose in reports we file or submit under the Exchange Act is accumulated and communicated to management, and recorded, processed, summarized and reported within the time periods specified in the rules and forms of the SEC. We believe that any disclosure controls and procedures or internal controls and procedures, no matter how well-conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met.

These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. For example, our directors or executive officers could inadvertently fail to disclose a new relationship or arrangement causing us to fail to make any related party transaction disclosures. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by an unauthorized override of the controls. Accordingly, because of the inherent limitations in our control system, misstatements due to error or fraud may occur and not be detected.

Future changes in financial accounting standards or practices may cause adverse and unexpected revenue fluctuations and adversely affect our reported results of operations.

Future changes in financial accounting standards may cause adverse, unexpected revenue fluctuations and affect our reported financial position or results of operations. Financial accounting standards in the United States are constantly under review and new pronouncements and varying interpretations of pronouncements have occurred with frequency in the past and are expected to occur again in the future. As a result, we may be required to make changes in our accounting policies. Those changes could affect our financial condition and results of operations or the way in which such financial condition and results of operations are reported. Compliance with new accounting standards may also result in additional expenses. As a result, we intend to invest all reasonably necessary resources to comply with evolving standards, and this investment may result in increased general and administrative expenses and a diversion of management time and attention from business activities to compliance activities. See the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations—Recently Adopted Accounting Standards."

In particular, in May 2014, the FASB issued ASU No. 2014-09, *Revenue from Contracts with Customers* (Topic 606), which supersedes the revenue recognition requirements in ASC 605, *Revenue Recognition*. The core principle of ASU 2014-09 is that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. As an "emerging growth company" the JOBS Act allows us to delay adoption of new or revised accounting standards applicable to public companies until such pronouncements are made applicable to private companies.

We are an "emerging growth company," and we cannot be certain if the reduced reporting requirements applicable to emerging growth companies will make our common stock less attractive to investors.

We are an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012, as amended, or the JOBS Act, and we intend to take advantage of some of the exemptions from reporting requirements that are applicable to other public companies that are not emerging growth companies, including:

- being permitted to provide only two years of audited financial statements, in addition to any required unaudited interim financial statements, with correspondingly reduced "Management's Discussion and Analysis of Financial Condition and Results of Operations" disclosure;
- not being required to comply with the auditor attestation requirements in the assessment of our internal control over financial reporting;
- 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; and
- not being required to hold a non-binding advisory vote on executive compensation or obtain stockholder approval of any golden parachute payments not previously approved.

In addition, as an "emerging growth company" the JOBS Act allows us to delay adoption of new or revised accounting pronouncements applicable to public companies until such pronouncements are made applicable to private companies, unless we later irrevocably elect not to avail ourselves of this exemption. We have elected to use this extended transition period under the JOBS Act. As a result, our consolidated financial statements may not be comparable to the financial statements of issuers who are required to comply with the effective dates for new or revised accounting standards that are applicable to public companies, which may make comparison of our financials to those of other public companies more difficult.

We cannot predict if investors will find our common stock less attractive because we will 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 more volatile. We may take advantage of these reporting exemptions until we are no longer an emerging growth company. We will remain an emerging growth company until the earlier of (1) the last day of the fiscal year (a) following the fifth anniversary of the completion of this offering, (b) in which we have total annual gross revenue of at least $1.07 billion or (c) in which we are deemed to be a large accelerated filer, which means the market value of our common stock that is held by non-affiliates exceeds $700 million as of the prior June 30th and (2) the date on which we have issued more than $1.0 billion in non-convertible debt during the prior three-year period.

Delaware law and provisions in our amended and restated certificate of incorporation and amended and restated bylaws that will be in effect at the completion of this offering could make a merger, tender offer or proxy contest difficult, thereby depressing the trading price of our common stock.

Following the completion of this offering, our status as a Delaware corporation and the anti-takeover provisions of the Delaware General Corporation Law may discourage, delay or prevent a change in control by prohibiting us from engaging in a business combination with an interested stockholder for a period of three years after the person becomes an interested stockholder, even if a change of control would be beneficial to our existing stockholders. In addition, our amended and restated certificate of incorporation and amended and restated bylaws that will be in effect at the completion of this offering will contain provisions that may make the acquisition of our company more difficult, including the following:

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

- the ability of our board of directors to issue shares of preferred stock and to determine the price and other 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 exclusive right of our board of directors to elect a director to fill a vacancy created by the expansion of our board of directors or the resignation, death or removal of a director, which prevents stockholders from being able to fill vacancies on our board 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 a majority vote of our entire board of directors, the chairman of our board of directors or our chief executive officer, which could delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors;
- the requirement for the affirmative vote of holders of at least 66 and 2 / 3 % of the voting power of all of the then-outstanding shares of the voting stock, voting together as a single class, to amend the provisions of our amended and restated certificate of incorporation relating to the management of our business or our amended and restated bylaws, which may inhibit the ability of an acquirer to affect such amendments to facilitate an unsolicited takeover attempt; and
- advance notice procedures with which stockholders must comply 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.

In addition, as a Delaware corporation, we are subject to Section 203 of the Delaware General Corporation Law. These provisions may prohibit large stockholders, in particular those owning 15% or more of our outstanding voting stock, from merging or combining with us for a certain period of time. A Delaware corporation may opt out of this provision by express provision in its original certificate of incorporation or by amendment to its certificate of incorporation or bylaws approved by its stockholders. However, we have not opted out of this provision.

These and other provisions in our amended and restated certificate of incorporation, amended and restated bylaws and Delaware law could make it more difficult for stockholders or potential acquirors to obtain control of our board of directors or initiate actions that are opposed by our then-current board of directors, including delay or impede a merger, tender offer or proxy contest involving our company. The existence of these provisions could negatively affect the price of our common stock and limit opportunities for you to realize value in a corporate transaction.

For information regarding these and other provisions, see the section titled "Description of Capital Stock."

Our amended and restated certificate of incorporation that will become effective upon the closing of this offering designates the state courts in the State of Delaware or, if no state court located within the State of Delaware has jurisdiction, the federal court for the District of Delaware, as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by our stockholders, which could discourage lawsuits against our company and our directors, officers and employees.

Our amended and restated certificate of incorporation that will become effective upon the closing of this offering provides that, to the fullest extent permitted by law, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or, if the Court of Chancery does not have jurisdiction, the federal district court for the District of Delaware) will be the sole and exclusive forum for any derivative action or proceeding brought on our behalf, any action asserting a claim of breach of a fiduciary duty

owed by any of our directors, officers or employees to our company or our stockholders, any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law or our amended and restated certificate of incorporation or amended and restated bylaws, or any action asserting a claim against us governed by the internal affairs doctrine, but excluding actions to enforce a duty or liability created by the Exchange Act or any other claim for which the federal courts have exclusive jurisdiction. Furthermore, our amended and restated certificate of incorporation will also provide that unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States shall be the exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act, although investors will not be deemed to have waived our compliance with federal securities laws and the rules and regulations thereunder. These choice of 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 and may discourage these types of lawsuits. Furthermore, the enforceability of similar choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that a court could find these types of provisions to be inapplicable or unenforceable. If a court were to find the choice of forum provisions 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.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus includes forward-looking statements. All statements other than statements of historical facts contained in this prospectus are forward-looking statements, including statements about:

- our expectations regarding the timing, scope and results of our development activities, including our ongoing and planned clinical trials;
- the timing of and plans for regulatory filings;
- our plans to obtain and maintain regulatory approvals of our product candidates in any of the indications for which we plan to develop them, and any related restrictions, limitations, and/or warnings in the label of an approved product candidate;
- the potential benefits of our product candidates and technologies;
- our expectations regarding the use of our platform technologies to generate novel product candidates;
- the market opportunities for our product candidates and our ability to maximize those opportunities;
- our business strategies and goals;
- estimates of our expenses, capital requirements, any future revenue, and need for additional financing;
- our expectations regarding potentially establishing a pilot manufacturing facility;
- the performance of our third-party suppliers and manufacturers,
- our expectations regarding our ability to obtain and maintain intellectual property protection for our product candidates and our ability to operate our business without infringing on the intellectual property rights of others;
- our expectations regarding developments and projections relating to our competitors, competing therapies that are or become available; and our industry;
- regulatory development in the United States and foreign countries; and
- our expectations regarding the uses of the net proceeds from this offering and the sufficiency of such net proceeds together with our existing cash and cash equivalents to fund our operations.

The words “believe,” “may,” “will,” “estimate,” “continue,” “anticipate,” “design,” “intend,” “expect,” “could,” “plan,” “potential,” “predict,” “seek,” “should,” “would” or the negative version of these words and similar expressions are intended to identify forward-looking statements. We have based these forward-looking statements on our current expectations and projections about future events and trends that we believe may affect our financial condition, results of operations, strategy, short- and long-term business operations and objectives and financial needs.

These forward-looking statements are subject to a number of risks, uncertainties and assumptions, including those described in the section titled “Risk Factors.” Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties and assumptions, the forward-looking events and circumstances discussed in this prospectus may not occur and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements.

You should not rely upon forward-looking statements as predictions of future events. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee that the future results, advancements, discoveries, levels of activity, performance or events and circumstances reflected in

the forward-looking statements will be achieved or occur. Moreover, except as required by law, neither we nor any other person assumes responsibility for the accuracy and completeness of the forward-looking statements. We undertake no obligation to update publicly any forward-looking statements for any reason after the date of this prospectus to conform these statements to actual results or to changes in our expectations.

You should read this prospectus and the documents that we reference in this prospectus and have filed with the SEC as exhibits to the registration statement of which this prospectus is a part with the understanding that our actual future results, levels of activity, performance and events and circumstances may be materially different from what we expect.

DIVIDEND POLICY

We have never declared or paid any cash dividends on our capital stock and we do not currently intend to pay any cash dividends on our capital stock for the foreseeable future. We currently intend to retain all available funds and any future earnings to support operations and to finance the growth and development of our business. Any future determination to pay dividends will be made at the discretion of our board of directors' subject to applicable laws and will depend upon, among other factors, our results of operations, financial condition, contractual restrictions and capital requirements. In addition, the loan and security agreement, as amended, governing our indebtedness contains restrictions on our ability to declare and pay cash dividends on our capital stock.

USE OF PROCEEDS

We estimate that the net proceeds from this offering will be approximately $ million, or $ million if the underwriters exercise their option to purchase additional shares in full, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, assuming an initial public offering price of $ per share, which is the midpoint of the estimated price range set forth on the cover page of this prospectus. 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 $ million, assuming the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions. Similarly, each increase (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 (decrease) our net proceeds from this offering by $ million, assuming no change in the assumed initial public offering price per share and after deducting the estimated underwriting discounts and commissions.

The principal purposes of this offering are to increase our financial flexibility and create a public market for our common stock. We intend to use the net proceeds from this offering as follows:

- approximately $ million for our ongoing clinical development of P-BCMA-101, our autologous CAR-T product candidate for relapsed/refractory multiple myeloma, including clinical trial costs and manufacturing expenses;
- approximately $ million for developing our preclinical product candidates and research programs for our CAR-T and gene therapy platforms; and
- the remainder for working capital and other general corporate purposes.

Based upon our current operating plan, we believe that the net proceeds from this offering, together with our existing cash and cash equivalents as of September 30, 2018, will enable us to fund our operations through at least the next months from the date of this offering, including with respect to P-BCMA-101 and . However, the expected net proceeds from this offering will not be sufficient for us to fund any of our product candidates through regulatory approval, and we will need to raise substantial additional capital to complete the development and commercialization of our product candidates. Because the time and costs to complete development of our product candidates will depend on the results of future preclinical studies and clinical trials and discussions with and decisions by regulatory authorities, we cannot reasonably estimate the amount of additional capital we will require to complete development. We may also use a portion of the net proceeds from this offering designated for working capital and general corporate purposes to establish an internal pilot GMP manufacturing facility for our product candidates, which we estimate would cost up to $15.0 million, or to in-license, acquire or invest in complementary businesses, technologies, products or assets. Although we currently have no agreements, commitments or obligations to do so, we evaluate such opportunities and engage in related discussions with third parties from time to time. To the extent that we elect to establish an internal pilot GMP manufacturing facility and the net proceeds of this offering are insufficient to complete the facility, we would intend to raise the required capital through equity offerings, debt financings or other capital sources, including potentially grants, collaborations, licenses or other similar arrangements.

Our expected use of the net proceeds from this offering represents our intentions based upon our current plans and business conditions. 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 completion of this offering or the amounts that we will actually spend on the uses set forth above. The amounts and timing of our actual expenditures and the extent of our preclinical, clinical and future development activities may vary significantly depending on numerous factors, including the progress of our development efforts, the status of and results from our ongoing and planned clinical trials, our ability to take advantage of expedited programs or to obtain regulatory approval for product candidates, the timing and costs associated with the manufacture and supply of product candidates for clinical

development or commercialization and any unforeseen cash needs. As a result, our management will retain broad discretion over the allocation of the net proceeds from this offering.

Pending our use of the net proceeds from this offering, we plan to invest the net proceeds in a variety of capital preservation investments, including short-term interest-bearing investment-grade securities, certificates of deposit or government securities.

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 give effect to: (i) the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 18,200,011 shares of our common stock; (ii) the automatic conversion of all outstanding warrants to purchase shares of preferred stock into warrants to purchase up to an aggregate of 133,830 shares of our common stock and the resulting reclassification of the carrying value of the warrant liability to additional paid-in capital; and (iii) the filing and effectiveness of our amended restated certificate of incorporation, each of which will occur immediately prior to the completion of this offering; and
- on a pro forma as adjusted basis to give effect to (i) the pro forma adjustments set forth above and (ii) the sale and issuance of shares of our common stock by us in this offering and our receipt of the estimated net proceeds from this offering, based upon an assumed initial public offering price of $ per share, which is the midpoint of the estimated price range set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

You should read this information together with our consolidated financial statements and the related notes included elsewhere in this prospectus and the information set forth in the sections titled “Selected Consolidated Financial Data” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

	As of September 30, 2018		
(In thousands, except share and per share data)	Actual	Pro Forma	Pro Forma as Adjusted(1)
Cash and cash equivalents	$ 38,534	$ 38,534	$
Convertible preferred stock warrant liability	$ 1,336	—	—
Convertible preferred stock, $0.0001 par value per share; 18,410,938 shares authorized, 18,200,011 issued and outstanding, actual; no shares authorized, issued and outstanding, pro forma and pro forma as adjusted	$ 72,460	$ —	$ —
Stockholders’ (deficit) equity:			
Preferred stock, $0.0001 par value per share; no shares authorized, issued and outstanding, actual; shares authorized, no shares issued and outstanding, pro forma and pro forma as adjusted	—	—	
Common stock, $0.0001 par value per share; 40,000,000 shares authorized, 15,290,636 shares issued and outstanding, actual; shares authorized, shares issued and outstanding, pro forma; shares authorized, shares issued and outstanding, pro forma as adjusted	2	3	
Additional paid-in capital	(11,414)	62,381	
Accumulated deficit	(52,803)	(52,803)	
Total stockholders’ (deficit) equity	(64,215)	9,581	
Total capitalization	$ 9,581	9,581	$

(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 stockholders' equity and total capitalization by approximately $, 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 estimated underwriting discounts and commissions and estimated offering expenses payable by us. Similarly, each increase (decrease) of 1.0 million shares in the number of shares offered by us, as set forth on the cover page of this prospectus, at the assumed initial public offering price, would increase (decrease) each of cash and cash equivalents, additional paid-in capital, total stockholders' equity and total capitalization by approximately $, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. The pro forma as adjusted information discussed above is illustrative only and will be adjusted based on the actual initial public offering price and other terms of this offering determined at pricing.

(2) Gives effect to (i) the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 18,200,011 shares of common stock upon the closing of this offering and (ii) all outstanding warrants to purchase shares of preferred stock becoming warrants to purchase shares of common stock upon the closing of this offering.

The outstanding share information in the table above excludes, as of September 30, 2018, the following:

- 2,468,240 shares of common stock issuable upon the exercise of options outstanding as of September 30, 2018 with a weighted-average exercise price of $2.61 per share;
- shares of our common stock reserved for issuance under our 2018 Equity Incentive Plan, or the 2018 Plan, which will become effective in connection with this offering, as well as any automatic annual increases in the number of shares of common stock reserved for future issuance under the 2018 Plan, as more fully described in "Equity Compensation—Equity Plans";
- shares of our common stock reserved for future issuance under our 2018 Employee Stock Purchase Plan, or 2018 ESPP, which will become effective in connection with this offering, as well as any automatic annual increases in the number of shares of common stock reserved for future issuance under the 2018 ESPP, as more fully described in "Equity Compensation—Equity Plans";
- 116,618 shares of common stock issuable upon the exercise of outstanding warrants as of September 30, 2018, at an exercise price of $3.43 per share;
- 17,212 shares of common stock issuable upon the exercise of an outstanding warrant as of September 30, 2018, at an exercise price of $5.81 per share; and
- up to 1,893,287 shares of common stock potentially issuable to the former stockholders of Vindico NanoBioTechnology, Inc. if a specified scientific development milestone is achieved prior to July 31, 2019.

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 assumed initial public offering price per share and the pro forma as adjusted net tangible book value per share of our common stock after this offering.

Historical net tangible book value (deficit) per share represents our total tangible assets less our liabilities and preferred stock that is not included in equity divided by the total number of shares of common stock outstanding. As of September 30, 2018, our historical net tangible book deficit was approximately $69.8 million, or $4.56 per share. Our pro forma net tangible book value as of September 30, 2018, was approximately $ million, or $ per share, after giving effect to the automatic conversion of all outstanding shares of our preferred stock into an aggregate of 18,200,011 shares of our common stock immediately prior to the completion of this offering.

After giving further effect to receipt of the net proceeds of our 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 estimated price range set forth on the cover page of this prospectus and after deducting the 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 $ per share. This represents an immediate increase in pro forma net tangible book value of $ per share to our existing stockholders and an immediate dilution of $ per share to investors purchasing common stock in this offering.

The following table illustrates this dilution to new investors on a per share basis:

Assumed initial public offering price per share		$
Historical net tangible book deficit per share at September 30, 2018	$(4.56)	
Pro forma increase in historical net tangible book value per share attributable to conversion of all outstanding shares of preferred stock		
Pro forma net tangible book value per share at September 30, 2018, before giving effect to this offering		
Increase in pro forma net tangible book value per share attributable to investors participating in 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		$

Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share would increase (decrease) the pro forma as adjusted net tangible book value per share after this offering by approximately $, and dilution in pro forma net tangible book value per share to new investors by approximately $, 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 estimated underwriting discounts and commissions and the estimated offering expenses payable by us. Similarly, each increase 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 our pro forma as adjusted net tangible book value per share after this offering by approximately $ and decrease the dilution to investors participating in this offering by approximately $ per share, assuming that the assumed initial public offering price remains the same, and after deducting the estimated underwriting discounts and commissions and the estimated offering expenses payable by us. Each 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 decrease the pro forma as adjusted net tangible book value per share after this offering by approximately $ and increase the dilution to investors participating in this offering by approximately $ per share, assuming that the assumed initial public offering price remains the same, and after deducting the estimated underwriting discounts and commissions and the estimated offering expenses payable by us.

If the underwriters exercise their option to purchase additional shares of our common stock in full in this offering, the pro forma as adjusted net tangible book value after the offering would be $ per share, the increase in pro forma as adjusted net tangible book value per share to existing stockholders would be $ per share and the dilution per share to new investors would be $ per share, in each case assuming an initial public offering price of $ per share.

To the extent that outstanding options or warrants with an exercise price per share that is less than the pro forma as adjusted net tangible book value per share are exercised, new investors will experience further dilution. In addition, we may choose to raise additional capital due to market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. To the extent that 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.

The following table summarizes on a pro forma as adjusted basis as of September 30, 2018, the number of shares of common stock purchased or to be purchased from us, the total consideration paid or to be paid to us in cash and the weighted-average price per share paid by existing stockholders for shares issued prior to this offering and the price to be paid by new investors in this offering. The calculation below is based on an assumed initial public offering price of $ per share, before deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. As the table below shows, investors participating in this offering will pay an average price per share substantially higher than our existing stockholders paid.

	Shares Purchased		Total Consideration		Weighted-Average Price Per Share
	Number	Percent	Amount	Percent	
Existing stockholders		%	$	%	$
Investors participating in this offering					$
Total		100.0%	$	100.0%	

The foregoing tables and calculations exclude:

- 2,468,240 shares of common stock issuable upon the exercise of options outstanding as of September 30, 2018 with a weighted-average exercise price of $2.61 per share;
- shares of our common stock reserved for issuance under 2018 Plan, which will become effective in connection with this offering, as well as any automatic annual increases in the number of shares of common stock reserved for future issuance under the 2018 Plan, as more fully described in the section titled “Equity Compensation—Equity Plans;”
- shares of our common stock reserved for future issuance under our 2018 ESPP, which will become effective in connection with this offering, as well as any automatic annual increases in the number of shares of common stock reserved for future issuance under the 2018 ESPP, as more fully described in the section titled “Equity Compensation—Equity Plans;”
- 116,618 shares of common stock issuable upon the exercise of outstanding warrants as of September 30, 2018, at an exercise price of $3.43 per share;
- 17,212 shares of common stock issuable upon the exercise of an outstanding warrant as of September 30, 2018, at an exercise price of $5.81 per share; and
- up to 1,893,287 shares of common stock potentially issuable to the former stockholders of Vindico NanoBioTechnology, Inc. if a specified scientific development milestone is achieved prior to July 31, 2019.

SELECTED CONSOLIDATED FINANCIAL DATA

The following tables set forth selected historical consolidated financial data as of, and for the periods ended on, the dates indicated. We have derived the selected consolidated statements of operations data for the years ended December 31, 2016 and 2017 and the selected consolidated balance sheet data as of December 31, 2016 and 2017 from our audited consolidated financial statements included elsewhere in this prospectus. We have derived the selected consolidated statements of operations data for the nine months ended September 30, 2017 and 2018 and the selected consolidated balance sheet data as of September 30, 2018 from our unaudited condensed consolidated financial statements included elsewhere in this prospectus. The unaudited condensed consolidated financial statements have been prepared on a basis consistent with our audited consolidated financial statements included in this prospectus and, in the opinion of our management, reflect all adjustments, consisting only of normal recurring adjustments, necessary to fairly state our financial position as of September 30, 2018 and results of operations for the nine months ended September 30, 2017 and 2018. 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 the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations."

	Year Ended December 31,		Nine months Ended September 30,	
	2016	2017	2017	2018
			(unaudited)	
Consolidated Statements of Operations Data:				
(In thousands, except share and per share amounts)				
Revenue	$ 9,768	$ 2,985	$ 2,985	$ —
Operating expenses:				
Research and development	9,264	19,099	14,745	21,130
General and administrative	5,353	5,479	3,884	7,277
Increase (decrease) in contingent consideration	—	(1,925)	(768)	1,462
Total operating expenses	14,617	22,653	17,861	29,869
Loss from operations	(4,849)	(19,668)	(14,876)	(29,869)
Other income (expense):				
Interest expense	—	(558)	(228)	(1,167)
Other income (expense), net	109	37	45	(686)
Net loss before income tax	(4,740)	(20,189)	(15,059)	(31,722)
Income tax benefit	165	527	188	208
Net loss and comprehensive loss	$ (4,575)	$ (19,662)	$ (14,871)	$ (31,514)
Net loss per share attributable to common stockholders, basic and diluted	$ (0.35)	$ (1.38)	$ (1.06)	$ (2.08)
Weighted-average shares of common stock outstanding, basic and diluted	12,909,518	14,198,666	14,044,726	15,158,963
Pro forma net loss per share attributable to common stockholders, basic and diluted(1)		$ (0.78)		$ (0.96)
Pro forma weighted-average shares of common stock outstanding, basic and diluted(1)		25,348,462		31,859,098

(1) See Notes 2 and 16 to our consolidated financial statements included elsewhere in this prospectus for an explanation of the method used to calculate the historical and pro forma net loss per share of common stock, basic and diluted, and the number of shares used in the computation of the per share amounts.

	December 31, 2016	December 31, 2017	September 30, 2018 (unaudited)
Consolidated Balance Sheet Data:			
(In thousands)			
Cash and cash equivalents	$ 17,892	$ 15,625	$ 38,534
Working capital(1)	8,448	8,582	30,640
Total assets	28,190	25,454	47,712
Term debt, net of discount	—	9,708	19,023
Convertible preferred stock warrant liability	—	275	1,336
Convertible preferred stock	31,063	42,146	72,460
Total stockholders' deficit	(14,645)	(33,543)	(64,215)

(1) We define working capital as total current assets less total 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 our financial condition and results of operations together with the section titled "Selected Consolidated Financial Data" and our consolidated financial statements and the related notes included elsewhere in this prospectus. Some of the information contained in this discussion and analysis or set forth elsewhere in this prospectus, including information with respect to our plans and strategy for our business and related financing, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in the section titled "Risk Factors," our actual results could differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Overview

We are a clinical-stage biopharmaceutical company focused on leveraging our proprietary next-generation, non-viral gene engineering technologies to create life-saving therapeutics for patients with high unmet medical need. We have built a wholly-owned pipeline of autologous and allogeneic chimeric antigen receptor T cell, or CAR-T, product candidates, initially focused on the treatment of hematological malignancies and solid tumors.

P-BCMA-101 is an autologous CAR-T product candidate being developed to treat patients with relapsed/refractory multiple myeloma. We are currently conducting a Phase 1 clinical trial for P-BCMA-101 and plan to begin a Phase 2 clinical trial in the first half of 2019, moving toward a potential BLA filing with the FDA by the end of 2020. We believe our planned Phase 2 clinical trial has the potential to be a registrational trial, which is a trial that could support a BLA filing.

Our second autologous product candidate, P-PSMA-101, is being developed to treat patients with CRPC, a solid tumor indication. An additional autologous solid tumor product candidate, P-MUC1C-101, is in late-stage preclinical development for multiple solid tumor indications. We plan to file an IND with the FDA and begin a Phase 1 clinical trial for P-PSMA-101 in the second half of 2019 and for P-MUC1C-101 in 2020.

In addition to our autologous CAR-T programs, we are developing fully allogeneic product candidates derived from healthy donors. We plan to file an IND and begin a Phase 1 clinical trial for P-BCMA-ALLO1 our lead allogeneic product candidate for treatment of multiple myeloma, by late 2019 or early 2020. We plan to develop allogeneic versions of all of our hematological and solid tumor product candidates.

We were incorporated in December 2014 and subsequently spun out from Transposagen, a company that has been developing gene engineering technologies since 2003. Since our inception, our operations have focused on organizing and staffing our company, business planning, raising capital, establishing and protecting our intellectual property portfolio, developing our gene engineering technologies, identifying potential product candidates and undertaking research and development and manufacturing activities, including preclinical studies and clinical trials of our product candidates. We do not have any product candidates approved for sale and have not generated any revenue from product sales. We have funded our operations primarily through the sale of equity. Since our inception, we have raised an aggregate of $74.8 million of gross proceeds from the sale of shares of our convertible preferred stock and received $20.0 million of gross proceeds from borrowings under our loan agreement and $13.8 million in grant funding from the California Institute of Regenerative Medicine, or CIRM. As of September 30, 2018, we had cash and cash equivalents of $38.5 million. Since our inception, we have incurred significant operating losses. Our net losses were $4.6 million and $19.7 million for the years ended December 31, 2016 and 2017, respectively, and $31.5 million for the nine months ended September 30, 2018. As of September 30, 2018, we had an accumulated deficit of $52.8 million.

We expect our expenses and losses to increase substantially for the foreseeable future as we continue our development of, and seek regulatory approvals for, our product candidates, including P-BCMA-101, and begin to commercialize any approved products, as well as hire additional personnel, pay for accounting, audit, legal,

regulatory and consulting services, and pay costs associated with maintaining compliance with Nasdaq listing rules and SEC requirements, director and officer insurance, investor and public relations activities and other expenses associated with operating as a public company. Our net losses may fluctuate significantly from quarter-to-quarter and year-to-year, depending on the timing of our clinical trials and our expenditures on other research and development activities.

Based upon our current operating plan, we believe that the net proceeds from this offering, together with our existing cash and cash equivalents as of September 30, 2018, will enable us to fund our operations through at least the next months from the date of this offering. We do not expect to generate any revenues from product sales unless and until we successfully complete development and obtain regulatory approval for P-BCMA-101 or any other product candidates, which will not be for at least the next several years, if ever. If we obtain regulatory approval for any of our product candidates, we expect to incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution. Accordingly, until such time, if ever, as we can generate substantial product revenue, we expect to finance our operations through equity offerings, debt financings or other capital sources, including potentially grants, collaborations, licenses or other similar arrangements. However, we may not be able to secure additional financing or enter into such other arrangements in a timely manner or on favorable terms, if at all. Our failure to raise capital or enter into such other arrangements when needed would have a negative impact on our financial condition and could force us to delay, reduce or terminate our research and development programs or other operations, or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

The manufacturing process for our allogeneic product candidates is identical to the process for our autologous product candidates, except for the gene editing and a related additional purification step. We work with a number of third-party contract manufacturers for production of our product candidates. We also work with a variety of suppliers to provide our manufacturing raw materials including media, DNA and RNA components. In the future, we may also build a pilot GMP manufacturing facility to develop and manufacture preclinical materials and clinical supplies of our product candidates for Phase 1 and Phase 2 clinical trials. Any manufacturing facility build would substantially increase our operating expenses.

License Agreements

Below is a summary of the key terms for certain of our license agreements. For a more detailed description of these and our other license agreements, see the section titled “Business—License Agreements” and Notes 5, 13 and 17 to our consolidated financial statements included elsewhere in this prospectus.

License Agreement with Janssen Biotech Inc.

On August 3, 2015, we entered into a license agreement, or the Janssen Agreement, with Janssen Biotech Inc., or Janssen, pursuant to which we obtained exclusive worldwide rights to research, develop, manufacture and commercialize pharmaceutical products comprising autologous T-cells or any natural killer (NK) or NK-like cells expressing certain Centyrin molecules or Centyrin CAR molecules for the treatment or prevention of any disease in humans. This is the binding technology we use in our P-BCMA-101 and P-PSMA-101 product candidates. Under the Janssen Agreement, we also have the right to screen Janssen’s centyrin library for agents that bind or modify targets of interest for our internal research and development purposes for potential use in a licensed product.

Pursuant to the Janssen Agreement, we paid Janssen an upfront fee of $0.2 million. We are required to pay Janssen up to an aggregate of $75.8 million upon the achievement of certain clinical, regulatory and sales milestones for the first licensed product and up to an aggregate of $46.8 million upon the achievement of certain clinical, regulatory and sales milestones for each licensed product thereafter. We are also obligated to pay, on a product-by-product and country-by-country basis, royalties in the low single-digit percentage range on annual net sales, with the royalty rates varying depending on if there is a valid claim present within the licensed patent rights

covering the licensed product in the applicable country in which the net sales occur. The royalty rates are subject to reduction upon certain events.

April 2017 Commercial License Agreement with TeneoBio, Inc.

On April 27, 2017, we entered into a commercial license agreement, or the 2017 TeneoBio Agreement, with TeneoBio, Inc., or TeneoBio, pursuant to which we obtained exclusive worldwide rights to use and develop pharmaceutical products comprising allogeneic T-cells expressing a CAR molecule containing certain heavy chain sequences (VH) provided by TeneoBio for the treatment of human disease. We use a VH binder in our P-BCMA-ALLO1 product candidates.

Pursuant to the 2017 TeneoBio Agreement, we have paid TeneoBio $0.5 million through our selection of the antibodies licensed under the 2017 TeneoBio Agreement. We are required to pay TeneoBio up to an aggregate of $20.5 million upon the first achievement of certain clinical and regulatory milestones for any allogeneic product and up to an aggregate of $20.5 million upon the first achievement of certain clinical and regulatory milestones for any autologous product. We are also obligated to pay, on a product-by-product and country-by-country basis, a royalty in the low single-digit percentage on net sales of any licensed products.

August 2018 Commercial License Agreement with TeneoBio, Inc.

On August 3, 2018, we entered into a commercial license agreement, or the 2018 TeneoBio Agreement, with TeneoBio for the development and use of TeneoBio's human heavy chain only antibodies in CAR-T cell therapies. Under the terms of the 2018 TeneoBio Agreement, we have the option to obtain exclusive rights to research, develop and commercialize up to a certain number of targets from TeneoBio.

Pursuant to the 2018 TeneoBio Agreement, we paid TeneoBio an upfront fee of $4.0 million. We are required to pay additional fees in the low- to mid-six figure dollar range upon (a) selecting exclusivity for a particular target, which restricts TeneoBio from licensing that particular target to a third party for a period of time, (b) continuing exclusivity for any selected target on each anniversary thereafter and (c) exercising our commercial option for each target. We are required to pay TeneoBio up to an aggregate of $31.0 million upon the first achievement of certain clinical and regulatory milestones for each licensed product. We are also obligated to pay, on a product-by-product and country-by-country basis, a low single-digit percentage royalty on net sales of any licensed products. The royalty rate is subject to reduction upon certain events.

Acquisition of Vindico

On October 10, 2016, we completed the acquisition of all the outstanding ownership interests in Vindico NanoBiotechnology, Inc. (Vindico). We paid $1.1 million in cash and issued an aggregate of 437,115 shares of common stock to the selling shareholders. The common stock was valued at $0.7 million based on the fair value of our common stock at October 10, 2016 or $1.51 per share. We paid additional cash consideration of $0.6 million in 2017.

We may issue additional shares of common stock based on the achievement of a preclinical developmental milestone. The number of shares issued and associated fair value could vary based on when and if the milestone is reached. The number of shares of common stock potentially issuable at September 30, 2018 was 3,206,997, and was subsequently reduced to 1,893,287 on October 10, 2018.

CIRM Grant Funding

In December 2017, we were granted an award in the amount of $19.8 million from CIRM to support our clinical trial for P-BCMA-101. The terms of the award include an option to repay the grant or convert it to a

royalty obligation upon commercialization of the program. Based upon the terms of the agreement, we will record proceeds as a liability when received. The award provides for a $4.6 million initial payment, which was received in January 2018, an additional $8.2 million, which was received through November 2018, and up to $7.0 million in future milestone payments.

In September 2018, we were granted an additional award in the amount of $4.0 million from CIRM to support our preclinical studies for P-PSMA-101. The award provided for a $1.0 million initial payment, which was received in September 2018, and up to $3.0 million in future milestone payments.

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 the sale of products in the near future. We have previously generated revenue under a collaboration agreement with Janssen which was terminated in January 2017. Over time, we may generate revenue from product sales, payments from any future collaboration or license agreements, or any combination thereof.

Operating Expenses

Research and development

Research and development expenses consist primarily of costs incurred for our research activities, including development of our platform technologies, our drug discovery efforts and the development of our product candidates, which include:

- employee-related expenses, including salaries, related benefits and stock-based compensation expense for employees engaged in research and development functions;
- expenses incurred in connection with the preclinical and clinical development of our product candidates and research programs, including under agreements with third parties, such as consultants, contractors and contract research organizations, or CROs;
- the cost of developing and scaling our manufacturing process and manufacturing drug products for use in our preclinical studies and clinical trials, including under agreements with third parties, such as consultants, contractors and contract manufacturing organizations, or CMOs;
- payments made under third-party licensing agreements;
- laboratory supplies and research materials; and
- facilities, depreciation and other expenses, which include direct and allocated expenses for rent and maintenance of facilities and insurance.

We expense research and development costs as incurred. Advance payments that we make for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses or other long-term assets. These amounts are expensed as the related goods are delivered or the services are performed.

Our direct external research and development expenses include fees, reimbursed materials and other costs paid to consultants, contractors, CMOs and CROs in connection with our preclinical and clinical development and manufacturing activities. We do not allocate employee costs, costs associated with our discovery efforts, laboratory supplies and facilities expenses, including depreciation or other indirect costs, to specific product development programs because these costs are deployed across multiple programs and our platform technology and, as such, are not separately classified.

Product candidates in later stages of clinical development generally have higher development costs than those in earlier stages of clinical development, primarily due to CRO activity and manufacturing expenses. We expect that our research and development expenses will increase substantially in connection with our planned preclinical and clinical development activities in the near term and in the future. At this time, we cannot accurately estimate or know the nature, timing and costs of the efforts that will be necessary to complete the preclinical and clinical development of any of our product candidates. Our clinical development costs may vary significantly based on factors such as:

- per patient trial costs;
- the number of trials required for approval;
- the number of sites included in the trials;
- the countries in which the trials are conducted;
- the length of time required to enroll eligible patients;
- the number of patients that participate in the trials;
- the number of doses that patients receive;
- the drop-out or discontinuation rates of patients;
- potential additional safety monitoring requested by regulatory agencies;
- the duration of patient participation in the trials and follow-up;
- the cost and timing of manufacturing our product candidates;
- the phase of development of our product candidates; and
- the efficacy and safety profile of our product candidates.

A change in the outcome of any of these variables with respect to the development of any of our product candidates could significantly change the costs and timing associated with the development of that product candidate. We may never succeed in obtaining regulatory approval for any of our product candidates. We may obtain unexpected results from our clinical trials and preclinical studies.

General and administrative

General and administrative expenses consist primarily of salaries and related costs, including stock-based compensation, for personnel in executive, finance and administrative functions. General and administrative expenses also include direct and allocated facility-related costs as well as professional fees for legal, patent, consulting, investor and public relations, accounting and audit services. We anticipate that our general and administrative expenses will increase in the future as we increase our headcount to support our continued research activities and development of our product candidates, including P-BCMA-101, and begin to commercialize any approved products. We also anticipate that our general and administrative expenses will increase as a result of payments for accounting, audit, legal, regulatory and consulting services, as well as costs associated with maintaining compliance with Nasdaq listing rules and SEC requirements, director and officer insurance, investor and public relations activities and other expenses associated with operating as a public company.

Increase (decrease) in contingent consideration

In connection with our acquisition of Vindico in October 2016, we agreed to pay additional consideration based on the achievement of a certain milestone using the acquired technology. The additional purchase consideration is payable in shares of our common stock. The number of shares of common stock issuable and the

associated fair value can vary depending on (i) the price paid by investors in a qualified equity financing prior to the achievement of the milestone and (ii) when and if the milestone is reached. We classify this contingent consideration as a liability on our consolidated balance sheets that we remeasure to fair value at each reporting date, and we recognize changes in the fair value of the contingent consideration liability as a component of other income (expense) in our consolidated statements of operations. We will continue to recognize changes in the fair value of the contingent consideration liability until the milestone is met or the milestone period has expired. For additional detail, see the subsections titled "—License Agreements—Acquisition of Vindico" above and "—Critical Accounting Policies and Significant Judgments and Estimates—Valuation of Contingent Liability" below, and Notes 4 and 6 to our annual consolidated financial statements included elsewhere in this prospectus.

Other Income (Expense)

Interest expense

Interest expense consists of (i) interest expense on outstanding borrowings under our loan agreement and (ii) amortization of debt discount and debt issuance costs.

Other income (expense), net

Other income (expense), net consists of (i) interest income and (ii) miscellaneous income and expense unrelated to our core operations.

Interest income is comprised of interest earned on our invested cash balances. We expect our interest income to increase as we invest the cash received from the sale of Series B preferred stock in March 2018 and the net proceeds from this offering.

Miscellaneous income and expense unrelated to our core operations is comprised of:

- Changes in fair value of warrant liability. We issued warrants to purchase shares of our Series A-1 preferred stock in connection with our loan agreement in July 2017. We issued additional warrants to purchase shares of our Series B preferred stock in connection with the amendment of our loan agreement in August 2018. We classify these warrants as a liability on our consolidated balance sheets that we remeasure to fair value at each reporting date, and we recognize changes in the fair value of the warrant liability as a component of other income (expense) in our consolidated statements of operations. We will continue to recognize changes in the fair value of the warrant liability until the warrants are exercised, expire or qualify for equity classification. Upon the closing of this offering, the preferred stock warrants will become exercisable for common stock instead of preferred stock and the fair value of the warrant liabilities at that time will be reclassified to additional paid-in-capital. For the year ended December 31, 2017, there was no change in fair value of these preferred stock warrants. For additional detail, see the subsection titled "—Critical Accounting Policies and Significant Judgments and Estimates—Valuation of Warrants to Purchase Preferred Stock" below and Note 10 to our annual consolidated financial statements included elsewhere in this prospectus.

Results of Operations

Comparison of the Nine Months Ended September 30, 2017 and 2018

The following table summarizes our results of operations for the nine months ended September 30, 2017 and 2018 (in thousands):

	2017	2018	Change
Revenue	$ 2,985	$ —	$ (2,985)
Operating expenses:			
Research and development	14,745	21,130	6,385
General and administrative	3,884	7,277	3,393
Increase (decrease) in contingent consideration	(768)	1,462	2,230
Total operating expenses	17,861	29,869	12,008
Loss from operations	(14,876)	(29,869)	(14,993)
Other income (expense):			
Interest expense	(228)	(1,167)	(939)
Other income (expense), net	45	(686)	(731)
Net loss before income tax	(15,059)	(31,722)	(16,663)
Income tax benefit	188	208	20
Net loss and comprehensive loss	$ (14,871)	$ (31,514)	$(16,643)

Revenue

Revenue was $3.0 million for the nine months ended September 30, 2017, compared to zero for the nine months ended September 30, 2018. This decrease in revenue of $3.0 million was due to the termination of a collaboration agreement with Janssen in early 2017.

Research and development expenses

The following table summarizes our research and development expense for the nine months ended September 30, 2017 and 2018 (in thousands):

	2017	2018	Change
Direct external research expenses by program:			
P-BCMA-101	$ 8,339	$ 9,051	$ 712
Other Programs	234	417	183
Subtotal	8,573	9,468	895
Unallocated costs	6,172	11,662	5,490
Total research and development expenses	$ 14,745	$ 21,130	$ 6,385

Research and development expenses were $14.7 million for the nine months ended September 30, 2017, compared to $21.1 million for the nine months ended September 30, 2018. This increase in research and development expenses of $6.4 million was primarily due to increases in the following: $3.5 million of in-license payments related to the timing of third-party license fees upon achievement of milestone events, $1.1 million of personnel expenses related to increased headcount, $1.1 million IPR&D impairment related to a delay in development and results of recent preclinical studies, and $0.9 million of contract manufacturing costs related to CRO expense related to increased enrollment in the ongoing P-BCMA-101 Phase 1 trial.

General and administrative expenses

General and administrative expenses were $3.9 million for the nine months ended September 30, 2017, compared to $7.3 million for the nine months ended September 30, 2018. This increase in general and administrative expenses of $3.4 million was primarily due to increases in the following: $2.7 million of legal and professional fees related to an increase in legal and patent costs related to our ongoing business activities and preparations to operate as a public company, $0.4 million of personnel expenses related to increased headcount and $0.3 million of facility and overhead expenses.

Increase (decrease) in contingent consideration

Decrease in contingent consideration was $0.8 million for the nine months ended September 30, 2017, compared to an increase in contingent consideration of $1.5 million for the nine months ended September 30, 2018. This increase in contingent consideration was due to an increase in our contingent consideration liability of $2.2 million resulting from a change in certain fair value assumptions, including an increase in our estimated share price, offset partially by a decrease in the probability of successfully completing the applicable milestone within the contractual timeline.

Interest expense

Interest expense was $0.2 million for the nine months ended September 30, 2017, compared to $1.2 million for the nine months ended September 30, 2018. This increase in interest expense of $1.0 million was due to a loan agreement originally entered into in July 2017, in addition to an increase in the principal outstanding in August 2018.

Other income (expense), net

Other income was $45,000 for the nine months ended September 30, 2017, compared to other expense of $0.7 million for the nine months ended September 30, 2018. This change in other income (expense) of $0.7 million was primarily related to an increase of $0.9 million in warrant liability.

Comparison of the Years Ended December 31, 2016 and 2017

The following table summarizes our results of operations for the years ended December 31, 2016 and 2017 (in thousands):

	2016	2017	Change
Revenue	$ 9,768	$ 2,985	$ (6,782)
Operating expenses:			
Research and development	9,264	19,099	9,835
General and administrative	5,353	5,479	127
Increase (decrease) in contingent consideration	—	(1,925)	(1,925)
Total operating expenses	14,617	22,653	8,037
Loss from operations	(4,849)	(19,668)	(14,819)
Other income (expense):			
Interest expense	—	(558)	(558)
Other income (expense), net	109	37	(72)
Loss from operations before income tax	(4,740)	(20,189)	(15,449)
Income tax benefit	165	527	362
Net loss and comprehensive loss	$ (4,575)	$ (19,662)	$ (15,086)

Revenue

Revenue was $9.8 million for the year ended December 31, 2016, compared to $3.0 million for the year ended December 31, 2017. This decrease in revenue of $6.8 million was due to the termination of a collaboration agreement with Janssen in early 2017.

Research and development expenses

The following table summarizes our research and development expense for the years ended December 31, 2016 and 2017 (in thousands):

	2016	2017	Change
Direct external research expenses by program:			
P-BCMA-101	$ 3,441	$10,701	$ 7,260
Other Programs	429	282	(147)
Subtotal	3,870	10,983	7,113
Unallocated costs	5,394	8,116	2,722
Total research and development expenses	$ 9,264	$19,099	$ 9,835

Research and development expenses were $9.3 million for the year ended December 31, 2016, compared to $19.1 million for the year ended December 31, 2017. This increase in research and development expenses of $9.8 million was primarily due to increases in the following: $7.0 million of contract manufacturing costs related to the preparation of an IND submission and a clinical trial for P-BCMA-101, $1.4 million of personnel expenses related to increased headcount, $0.6 million of laboratory supplies expenses and $0.6 million of in-license payments related to the timing of third-party license fees upon achievement of milestone events.

General and administrative expenses

General and administrative expenses were $5.4 million for the year ended December 31, 2016, compared to $5.5 million for the year ended December 31, 2017. This increase in general and administrative expenses of $0.1 million was primarily due to increases in the following: $0.4 million of personnel expenses related to increased headcount and $0.3 million of facility and overhead expenses, offset in part by a $0.6 million decrease in legal and professional fees related to specific tax planning projects that were primarily performed in 2016 and to a lesser extent in 2017.

Increase (decrease) in contingent consideration

Increase (decrease) in contingent consideration was zero for the year ended December 31, 2016, compared to $1.9 million for the year ended December 31, 2017. This decrease in contingent consideration of $1.9 million was due to a decrease in our contingent consideration liability of $1.9 million resulting from a change in certain fair value assumptions, including a decrease in the probability of successfully completing the applicable milestone within the contractual timeline.

Interest expense

Interest expense was zero for the year ended December 31, 2016, compared to $0.6 million for the year ended December 31, 2017. This increase in interest expense of $0.6 million was due to a loan agreement originally entered into in July 2017.

Other income (expense), net

Other income (expense), net was $0.1 million for the year ended December 31, 2016, compared to $37,000 for the year ended December 31, 2017. This decrease in other income (expense) was primarily related to a decrease in interest income.

Liquidity and Capital Resources

We were incorporated in December 2014 and subsequently spun out from Transposagen, a company that has been developing gene engineering technologies since 2003. Since our inception in 2014, we have incurred significant operating losses. Our net losses were $4.6 million and $19.7 million for the years ended December 31, 2016 and 2017, respectively, and $31.5 million for the nine months ended September 30, 2018. As of September 30, 2018, we had an accumulated deficit of $52.8 million. Our operations have focused on developing our clinical and preclinical product candidates, establishing our intellectual property portfolio organizing and staffing our company, raising capital and general business planning. Our primary use of cash is to fund operating expenses, which consist primarily of research and development expenditures, and to a lesser extent, general and administrative expenditures. Cash used to fund operating expenses is impacted by the timing of when we pay these expenses, as reflected in the change in our outstanding accounts payable and accrued expenses. We have not yet commercialized any of our product candidates and we do not expect to generate revenue from sales of any product candidates for several years, if at all. We have funded our operations primarily through the sale of equity. Since our inception, we have raised an aggregate of $74.8 million of gross proceeds from the shares of our redeemable convertible preferred stock and received $20.0 million of gross proceeds from borrowings under our loan agreement and an aggregate of $13.8 million in grant funding from CIRM. As of September 30, 2018, we had cash and cash equivalents of $38.5 million.

Loan Agreement

In July 2017, we entered into a loan and security agreement, or 2017 Loan Agreement, with Oxford. As of December 31, 2017, we had outstanding borrowings of an aggregate of $10.0 million under this facility.

In August 2018, we entered into an amended agreement with Oxford, or the 2018 Loan Agreement, to increase principal amount of borrowings available under the facility to $20.0 million, modify the interest rate and extend the interest-only payment period and the maturity date. As of September 30, 2018, we had outstanding borrowings of an aggregate of $20.0 million under this amended facility.

Commencing in August 2018, outstanding borrowings under the 2018 Loan Agreement bear interest at a floating per annum rate equal to (i) 6.94% plus (ii) the greater of (a) the 30 day U.S. Dollar LIBOR rate reported in The Wall Street Journal on the last business day of the month that immediately precedes the month in which the interest will accrue and (b) 2.00%. As of September 30, 2018, the interest rate applicable to borrowings under the 2018 Loan Agreement was 9.1%. Interest only payments were extended through April 2020, with a maturity date of March 2023. We will be required to make a final payment of 7.5% of the principal balance outstanding, payable on the earlier of (i) the maturity date, (ii) acceleration of any term loan or (iii) the prepayment of the term loans.

Our obligations under the 2018 Loan Agreement are secured by a first priority security interest in substantially all of our current and future assets, other than our intellectual property. In addition, have also agreed not to encumber our intellectual property assets, except as permitted by the 2018 Loan Agreement. While any amounts are outstanding under the 2018 Loan Agreement, we are subject to a number of affirmative and restrictive covenants, including covenants regarding dispositions of property, business combinations or acquisitions, among other customary covenants. We are also restricted from paying dividends or making other distributions or annual payments on our capital stock in excess of $250,000, subject to limited exceptions.

Cash Flows

The following table sets forth the primary sources and uses of cash and cash equivalents for each of the periods presented below (in thousands):

	Year Ended December 31,		Nine Months Ended September 30,	
	2016	2017	2017	2018
Cash used in operating activities	$ (9,988)	$ (22,697)	$ (17,884)	$ (25,804)
Cash used in investing activities	(2,359)	(201)	(177)	(651)
Cash provided by financing activities	8,586	20,630	20,738	49,364
Net increase (decrease) in cash and cash equivalents	$ (3,761)	$ (2,268)	$ 2,677	$ 22,909

Cash used in operating activities

During the nine months ended September 30, 2017, operating activities used $17.9 million of cash, primarily resulting from our net loss of $14.9 million, in addition to net cash used by changes in our operating assets and liabilities of $2.9 million. Net cash provided by changes in our operating assets and liabilities for the year ended September 30, 2017 consisted primarily of a $2.7 million decrease in deferred revenue.

During the nine months ended September 30, 2018, operating activities used $25.8 million of cash, primarily resulting from our net loss of $31.5 million, offset in part by non-cash charges of $4.8 million and net cash provided by changes in our operating assets and liabilities of $1.0 million. Non-cash charges consisted primarily of $1.5 million increase in contingent consideration, a $1.1 million impairment of IPR&D and $0.9 million expense due to an increase in our warrant liabilities. Net cash provided by changes in our operating assets and liabilities for the nine months ended September 30, 2018 consisted primarily of a $1.1 million increase in accrued liabilities.

During the year ended December 31, 2016, operating activities used $10.0 million of cash, primarily resulting from our net loss of $4.6 million, in addition to net cash used by changes in our operating assets and

liabilities of $5.7 million, offset in part by non-cash charges of $0.3 million, primarily consisting of stock-based compensation. Net cash used by changes in our operating assets and liabilities for the year ended December 31, 2016 consisted primarily of a $7.3 million decrease in deferred revenue.

During the year ended December 31, 2017, operating activities used $22.7 million of cash, primarily resulting from our net loss of $19.7 million, in addition to net cash used by changes in our operating assets and liabilities of $1.9 million and non-cash gains of $1.2 million, mainly consisting of remeasurements of contingent consideration. Net cash provided by changes in our operating assets and liabilities for the year ended December 31, 2017 consisted primarily of a $2.7 million decrease in deferred revenue.

Decrease in deferred revenue for all periods was due to the recognition of an up-front payment over the term of a collaboration agreement. The increases in accrued liabilities were generally due to growth in our business, namely the advancement of our research and development programs.

Cash used in investing activities

During the nine months ended September 30, 2017, net cash used in investing activities was $0.2 million consisting of property and equipment purchases.

During the nine months ended September 30, 2018, net cash used in investing activities was $0.7 million consisting of property and equipment purchases.

During the year ended December 31, 2016, net cash used in investing activities was $2.4 million, consisting of $1.8 million in property and equipment purchases and $0.6 million for the acquisition of Vindico.

During the year ended December 31, 2017, net cash used in investing activities was $0.2 million, consisting of property and equipment purchases.

The purchase of property and equipment for all periods related to equipment purchases as we expanded our research and development and manufacturing activities, in addition to corporate office space.

Cash used in financing activities

During the nine months ended September 30, 2017, net cash provided by financings activities was $20.7 million, consisting primarily of $11.1 million in net proceeds from the sale of preferred stock and $9.8 million of net proceeds from borrowings under our loan agreement.

During the nine months ended September 30, 2018, net cash provided by financings activities was $49.4 million, consisting primarily of $30.3 million in net proceeds from the sale of preferred stock, $9.4 million of net proceeds from borrowings under our loan agreement and $9.4 million in grant payments from CIRM.

During the year ended December 31, 2016, net cash provided by financings activities was $8.6 million, consisting primarily of $8.2 million in net proceeds from the sale of preferred stock.

During the year ended December 31, 2017, net cash provided by financings activities was $20.6 million, consisting primarily of $11.1 million in net proceeds from the sale of preferred stock and $9.8 million of net proceeds from borrowings under our loan agreement.

Funding Requirements

We expect our expenses to increase substantially in connection with our ongoing activities, particularly as we conduct preclinical studies and clinical trials for our product candidates. In addition, upon the closing of this

offering, we expect to incur additional costs associated with operating as a public company. The timing and amount of our operating and capital expenditures will depend largely on many factors, including:

- scope, progress and results of our ongoing and planned preclinical studies and clinical trials for our product candidates;
- unanticipated serious safety concerns related to the use of our product candidates;
- timing of licensing payments we may be required to make based on the development of our product candidates;
- the number of and development requirements of other product candidates that we may pursue;
- the timing and outcome of regulatory review of our product candidates;
- changes in laws or regulations applicable to our product candidates, including but not limited to clinical trial requirements for approval;
- our decisions to initiate additional clinical trials, not to initiate any clinical trial or to terminate an existing clinical trial;
- the cost of obtaining raw materials and drug product for clinical trials and commercial supply;
- whether we decide to establish a pilot manufacturing facility for supply of product candidates for clinical trials; and
- additions or departures of key scientific or management personnel.

The accompanying financial statements have been prepared on a basis which assumes we are a going concern and does not include any adjustments to reflect the possible future effects on the recoverability and classification of assets or the amounts and classifications of liabilities that may result from any uncertainty related to our ability to continue as a going concern. As described in Note 1 to our annual consolidated financial statements, management has prepared cash flow forecasts which indicate that based on our expected operating losses and negative cash flows, there is substantial doubt about our ability to continue as a going concern without raising additional capital. Our ability to continue as a going concern is dependent upon a number of factors, including our ability to obtain the necessary financing to meet our obligations and repay our liabilities arising from obligations that become due in the ordinary course of business. Our ability to continue as a going concern may be viewed unfavorably by current and prospective investors, as well as by analysts and creditors. This may in turn make it more difficult for us to raise the additional financing necessary to continue to operate our business and we may be forced to significantly alter our business strategy, substantially curtail our current operations, or cease operations altogether. However, based upon our current operating plan, we believe that the net proceeds from this offering, together with our existing cash and cash equivalents as of September 30, 2018, will enable us to fund our operations through at least the next months from the date of this offering. We have based this estimate on assumptions that may prove to be wrong, and we could utilize our available capital resources sooner than we expect.

Until such time, if ever, as we can generate substantial product revenue, we expect to finance our operations through equity offerings, debt financings or other capital sources, including potentially grants, collaborations, licenses or other similar 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 acquisitions or capital expenditures or declaring dividends. If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or drug 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 or other

arrangements when needed, we may be required to delay, limit, reduce or terminate our research, product development or future commercialization efforts, or grant rights to develop and market drug candidates that we would otherwise prefer to develop and market ourselves.

Contractual Obligations and Commitments

The following table summarizes our contractual obligations as of December 31, 2017 (in thousands):

	Payments Due by Period				
	Total	Less than 1 Year	1 to 3 Years	4 to 5 Years	More than 5 Years
Operating lease commitments(1)	$ 7,707	$ 765	$1,592	$1,680	$ 3,670
Debt obligations(2)	12,685	1,931	7,613	3,141	—
Total(3)(4)	$20,392	$ 2,696	$9,205	$4,821	$ 3,670

(1) Amounts in table reflect payments due for our lease of office and laboratory space in San Diego, California under one operating lease agreement that expires in December 2026.
(2) Amounts in table reflect the contractually required principal, final payment and interest payments payable under the 2017 Loan Agreement. For purposes of this table, interest due under the 2017 Loan Agreement was calculated using an assumed interest rate of 8.19% per annum, which as the interest rate in effect as of December 31, 2017.
(3) In August 2018, we entered into an amendment of our 2017 Loan Agreement. The amended terms increase the principal outstanding by $10.0 million and extend principal payments due, commencing in 2020. As a result of our amendment, our contractual obligations will decrease by $1.5 million in 2018 and increase by $0.9 million in years 1-3 and $11.8 million in years 4-5 and $3.2 million after five years. Such amounts are not reflected in the table above.
(4) In October 2018, we entered into a new lease for office and laboratory space in San Diego, California. The lease term is expected to commence April 1, 2019 and expected to expire in December 2029. We are not the legal owner of the leased space. As a result of the new lease, our contractual obligations will increase by $2.8 million in years 1-3, $5.3 million in years 4-5 and $21.1 million after five years. Such amounts are not reflected in the table above.

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 of payments for services provided or expenses incurred, including noncancelable obligations of our service providers, up to one year after the date of cancellation. These payments are not included in the table above as the amount and timing of such payments are not known.

We have also entered into a several license agreements under which we are obligated to make aggregate milestone payments upon the achievement of specified preclinical, clinical and regulatory milestones as well as royalty payments. 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 our achievement of specified milestones or generating product sales. As of September 30, 2018, we were unable to estimate the timing or likelihood of achieving these milestones or generating future product sales. See the subsection titled “—License Agreements” above.

Critical Accounting Policies and Significant Judgments and Estimates

Our consolidated financial statements are prepared in accordance with generally accepted accounting principles in the United States, or GAAP. The preparation of our consolidated financial statements and related disclosures requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue, 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 Note 2 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.

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 applicable personnel to identify services that have been performed on our behalf and estimating the level of service performed and the associated cost incurred for the service when we have not yet been invoiced or otherwise notified of actual costs. The majority of our service providers invoice us in arrears for services, 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. We periodically confirm the accuracy of the estimates with the service providers and make adjustments if necessary. Examples of estimated accrued research and development expenses include fees paid to vendors in connection with preclinical development activities, CMOs in connection with the process development and scale-up activities and the production of clinical trial materials and CROs in connection with clinical trials.

We base the expense recorded related to contract research and manufacturing on our estimates of the services received and efforts expended pursuant to quotes and contracts with multiple CMOs and CROs that supply materials and conduct services. 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 service 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 the estimate, we adjust the accrual or 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 result in reporting amounts that are too high or too low in any particular period. To date, there have not been any material adjustments to our prior estimates of accrued research and development expenses.

Stock-Based Compensation

We measure stock-based awards granted to employees, non-employees and directors based on their fair value on the date of the grant using the Black-Scholes option-pricing model for options. Compensation expense for those awards is recognized over the requisite service period, which is generally the vesting period of the respective award. We use the straight-line method to record the expense of awards with service-based vesting conditions. Forfeitures are recognized as they occur.

The Black-Scholes option-pricing model requires the use of subjective assumptions to determine the fair value of stock-based awards. These assumptions include:

- *Fair value of common stock*—See the subsection titled "—Determination of fair value of common stock" below.
- *Expected term*—The expected term represents the period that stock-based awards are expected to be outstanding. The expected term for option grants is determined using the simplified method. The simplified method deems the expected term to be the midpoint between the vesting date and the contractual life of the stock-based awards.
- *Expected volatility*—Since we have been a privately held company and do not have any trading history for our common stock, the expected volatility is estimated based on the average volatility for comparable publicly traded biotechnology companies over a period equal to the expected term of the stock option

grants. The comparable companies were chosen based on their similar size, stage in the life cycle or area of specialty. We will continue to apply this process until a sufficient amount of historical information regarding the volatility of our own stock price becomes available.

- *Risk-free interest rate*—The risk-free interest rate is based on the U.S. Treasury zero coupon issues in effect at the time of grant for periods corresponding with the expected term of option.
- *Expected dividend*—We have never paid dividends on our common stock and have no plans to pay dividends on our common stock. Therefore, we used an expected dividend yield of zero.

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, considering contemporaneous independent third-party valuations of common stock, and 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. These independent third-party valuations 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*. These valuations were prepared using either an option pricing method, or OPM, or a hybrid method, both of which used market approaches to estimate our enterprise value. 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. Under this method, the common stock has value only if the funds available for distribution to stockholders exceeded the value of the preferred stock liquidation preferences at the time of the liquidity event, such as a strategic sale or a merger. A discount for lack of marketability of the common stock is then applied to arrive at an indication of value for the common stock. The hybrid method is a probability-weighted expected return method, PWERM, where the equity value in one or more scenarios is calculated using an OPM. The PWERM is a scenario-based methodology that estimates the fair value of common stock based upon an analysis of future values for the company, assuming various outcomes. The common stock value is based on the probability-weighted present value of expected future investment returns considering each of the possible outcomes available as well as the rights of each class of stock. The future value of the common stock under each outcome is discounted back to the valuation date at an appropriate risk-adjusted discount rate and probability weighted to arrive at an indication of value for the common stock. In addition to considering the results of these independent third-party valuations, 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, preferences and privileges 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 and progress of our development of manufacturing processes;
- external market conditions affecting the biopharmaceutical industry and trends within the biopharmaceutical industry;
- our financial position, including cash on hand, outstanding debt and our historical and forecasted performance and operating results;
- the lack of an active public market for our common stock and our 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 significantly

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.

As of September 30, 2018, the unrecognized stock-based compensation expense related to employee stock options was $3.8 million and is expected to be recognized as expense over a weighted-average period of approximately 3.5 years. The intrinsic value of all outstanding stock options as of September 30, 2018 was approximately $ million, based on the estimated public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, of which approximately $ million related to vested options and approximately $ million related to unvested options.

Valuation of Contingent Consideration

In connection with our acquisition of Vindico in October 2016, we agreed to pay additional purchase consideration based on the achievement of a certain developmental milestone using the acquired technology. The additional purchase consideration is payable in shares of our common stock. The number of shares of common stock issuable and the associated fair value can vary depending on (i) the price paid by investors in a qualified equity financing prior to the achievement of the milestone and (ii) when and if the milestone is reached. The fair value of this contingent consideration was estimated to be $4.4 million at the date of acquisition, based on the then expected number of shares issuable and a common stock fair value of $1.51 per share, which incorporated a probability of successfully meeting the milestone of 75%. The significant unobservable inputs used in the measurement of fair value of the contingent consideration are the probabilities of successful achievement of the milestone, the number of shares to be issued and the valuation of our common stock. Significant increases or decreases in the probability of success would result in a significantly higher or lower fair value measurement, respectively. Similarly, significant increases or decreases in the estimated valuation of common stock would result in a significantly higher or lower fair value measurement, respectively. As of December 31, 2016, the fair value of the common stock was determined with a probability of success of 75%. During 2017, the probability of successfully achieving the milestone by the end of the contingency period was reduced to 50%. This reduction in probability was offset by other factors which caused the fair value of the common stock to remain relatively consistent at $1.55. The estimated number of shares issuable was 2.9 million and 3.2 million, as of December 31, 2016 and 2017, respectively. As of September 30, 2018, the increase in contingent consideration was due to an increase in fair value of common stock, offset by the probability of successfully achieving the milestone by the end of the contingency period being reduced to 25%.

The value of the contingent consideration may change significantly as development progresses and additional data is obtained, impacting our assumptions regarding probabilities of successful achievement of the milestone and timing in which it is expected to be achieved. In addition, the use of different market assumptions and/or different valuation techniques could result in materially different fair value estimates.

We classify this contingent consideration as a liability on our consolidated balance sheets that we remeasure to fair value at each reporting date, and we recognize changes in the fair value of the contingent consideration liability as a component of operating income (loss) in our consolidated statements of operations. We will continue to recognize changes in the fair value of the contingent consideration liability until the milestone is met or the milestone period has expired.

Valuation of Warrants to Purchase Preferred Stock

We classify warrants to purchase shares of our Series A-1 preferred stock and Series B preferred stock as a liability on our consolidated balance sheets as these warrants are free-standing financial instruments that may

require us to transfer assets upon exercise. The warrants were initially recorded at fair value on the date of grant, and they are subsequently remeasured to fair value at each balance sheet date. Changes in fair value of the warrants are recognized as a component of other income (expense) in our consolidated statements of operations. We will continue to adjust the liability for changes in fair value until the warrants are exercised, expire or qualify for equity classification. Upon the closing of this offering, the preferred stock warrants will become exercisable for common stock instead of preferred stock and the fair value of the warrant liability at that time will be reclassified to additional paid-in capital.

We utilize the Black-Scholes option-pricing model, which incorporates assumptions and estimates to value the preferred stock warrants. We assess these assumptions and estimates on a quarterly basis as additional information impacting the assumptions is obtained. Similar to the fair value measurement of our common stock, estimates and assumptions impacting the fair value measurement of our preferred stock warrants include the fair value per share of the underlying Series A-1 preferred stock and Series B preferred stock, the remaining contractual term of the warrants, the expected volatility of the price of the underlying preferred stock, the risk-free interest rate and the expected dividend yield. The most significant assumption in the Black-Scholes option-pricing model impacting the fair value of the preferred stock warrants is the fair value of our preferred stock as of each remeasurement date. We determine the fair value per share of the underlying preferred stock by taking into consideration our most recent sales of our preferred stock as well as additional factors that we deem relevant (including the various factors analyzed to determine the fair value of our common stock described in the subsection titled "—Determination of fair value of common stock" above). As of December 31, 2017 and September 30, 2018, the fair value of the Series A-1 preferred stock was $3.06 and $11.72, respectively, per share. As of September 30, 2018, the fair value of the Series B preferred stock was $11.96 per share.

Off-Balance Sheet Arrangements

Since our inception, we have not engaged in any off-balance sheet arrangements, as defined in the rules and regulations of the SEC.

JOBS Act Accounting Election

The JOBS Act permits an "emerging growth company" such as us to take advantage of an extended transition period to comply with new or revised accounting standards applicable to public companies. We have elected to use this the extended transition period under the JOBS Act until the earlier of the date we (i) are no longer an emerging growth company or (ii) affirmatively and irrevocably opt out of the extended transition period provided in the JOBS Act. As a result, our consolidated financial statements may not be comparable to companies that comply with new or revised accounting pronouncements as of public company effective dates.

We will remain an emerging growth company until the last day of our fiscal year following the fifth anniversary of the date of the first sale of our common equity securities pursuant to an effective registration statement under the Securities Act, which fifth anniversary will occur in 2023. However, if certain events occur prior to the end of such five-year period, including if we become a "large accelerated filer" as defined in Rule 12b-2 under the Exchange Act, our annual gross revenues exceed $1.07 billion or we issue more than $1.0 billion of non-convertible debt in any three-year period, we will cease to be an emerging growth company prior to the end of such five-year period.

Recent Accounting Pronouncements

A description of recently issued accounting pronouncements that may potentially impact our financial position, result of operations or cash flows is disclosed in Note 2 to our annual consolidated financial statements and Note 2 to our interim condensed consolidated financial statements included elsewhere in this prospectus.

Quantitative and Qualitative Disclosures About Market Risks

Interest Rate Risk

As of December 31, 2017 and September 30, 2018, we had cash of $15.6 million and $38.5 million, respectively, and had no cash equivalents. Cash consists of deposits with financial institutions. Interest income is sensitive to changes in the general level of interest rates. However, due to the nature of these investments, a hypothetical 10% change in interest rates during any of the periods presented would not have had a material impact on our consolidated financial statements included elsewhere in this prospectus.

As of December 31, 2017, we had $10.0 million of borrowings outstanding under the 2017 Loan Agreement. Commencing in August 2018 upon amendment of the 2017 Loan Agreement, outstanding borrowings under this facility began to bear interest at a variable rate equal to 30-day LIBOR plus 6.94%, subject to a floor of 8.94%. As of September 30, 2018, we had $20.0 million of borrowings outstanding under the 2018 Loan Agreement. A hypothetical 10% change in interest rates would not have had a material impact on our consolidated financial statements included elsewhere in this prospectus.

Foreign Currency Exchange Risk

We are not currently exposed to significant market risk related to changes in foreign currency exchange rates. However, we have contracted with foreign vendors located in Europe and Canada and may contract with foreign vendors in the future. Our operations may be subject to fluctuations in foreign currency exchange rates in the future.

Effects of Inflation

Inflation generally affects us by increasing our cost of labor. We do not believe that inflation had a material effect on our consolidated financial results during the periods presented.

BUSINESS

Overview

We are a clinical-stage biopharmaceutical company focused on leveraging our proprietary next-generation, non-viral gene engineering technologies to create life-saving therapeutics for patients with high unmet medical need. We have built a wholly-owned pipeline of autologous and allogeneic chimeric antigen receptor T cell, or CAR-T, product candidates, initially focused on the treatment of hematological malignancies and solid tumors. Our proprietary gene engineering technologies are used to create product candidates predominantly comprised of a specific T cell subset, stem cell memory, or T_{SCM}, with the goal of addressing the limitations of other CAR-T therapies, including duration of response, the ability to treat solid tumors and tolerability concerns.

P-BCMA-101 is an autologous CAR-T product candidate that targets B cell maturation antigen, or BCMA, which is expressed on essentially all multiple myeloma cells. Preliminary results from our ongoing Phase 1 dose escalation clinical trial of P-BCMA-101 showed that as of November 21, 2018, of the 19 patients that were evaluable by International Myeloma Working Group, or IMWG, criteria, 14 had meaningful responses, with an objective response rate, or ORR, of 100% in three evaluable patients that had received the dose of P-BCMA-101 we expect to advance into Phase 2 clinical development. In addition, as of November 21, 2018, P-BCMA-101 continued to be well tolerated in the trial, with two mild and transient instances of cytokine release syndrome, or CRS, observed, and one patient with possible neurotoxicity, each of which occurred at doses below the planned Phase 2 dose. While we believe these preliminary results are encouraging, they are derived from a small number of patients and may not be predictive of future results or the durability of responses over time. We plan to begin a Phase 2 clinical trial for P-BCMA-101 in the first half of 2019, moving toward a potential biologics license application, or BLA, filing with the FDA by the end of 2020. We believe our planned Phase 2 clinical trial has the potential to be a registrational trial, which is a trial that could support a BLA filing. P-BCMA-101 has received a Regenerative Medicine Advanced Therapy, or RMAT, designation from the FDA, which is granted to regenerative medicine therapies that are intended to treat, modify, reverse or cure a serious or life-threatening disease or condition, and preliminary clinical evidence indicates that the product has the potential to address unmet medical needs for the disease or condition.

Our second autologous product candidate, P-PSMA-101, is being developed to treat patients with castrate-resistant prostate cancer, or CRPC, a solid tumor indication. P-PSMA-101 targets cells that express prostate-specific membrane antigen, or PSMA, which is expressed on most prostate cancer cells. An additional autologous solid tumor product candidate, P-MUC1C-101, is in late-stage preclinical development for multiple solid tumor indications. We plan to file an Investigational New Drug Application, or IND, with the FDA and begin a Phase 1 clinical trial for P-PSMA-101 in the second half of 2019 and for P-MUC1C-101 in 2020.

In addition to our autologous CAR-T programs, we are developing fully allogeneic product candidates derived from healthy donors, allowing for the treatment of hundreds or thousands of patients from a single manufacturing run. Our lead allogeneic product candidate, P-BCMA-ALLO1, is designed to have the same inherent properties and functions of P-BCMA-101, but with the ability to treat hundreds or thousands of patients from a single manufacturing run. We plan to file an IND and begin a Phase 1 clinical trial for P-BCMA-ALLO1 by late 2019 or early 2020. We plan to develop allogeneic versions of all of our hematological and solid tumor product candidates.

Cancer is a leading cause of death worldwide. Recently, the field of immuno-oncology has emerged as a breakthrough in cancer treatment by harnessing the patient’s immune system to detect and kill tumor cells. The field of immuno-oncology is expected to generate more than $100 billion in worldwide sales by 2025. Within immuno-oncology, the advent of CAR-T therapies has revolutionized treatment of some hematological malignancies by demonstrating profound initial response rates in highly refractory patients and in some cases, the ability to cure.

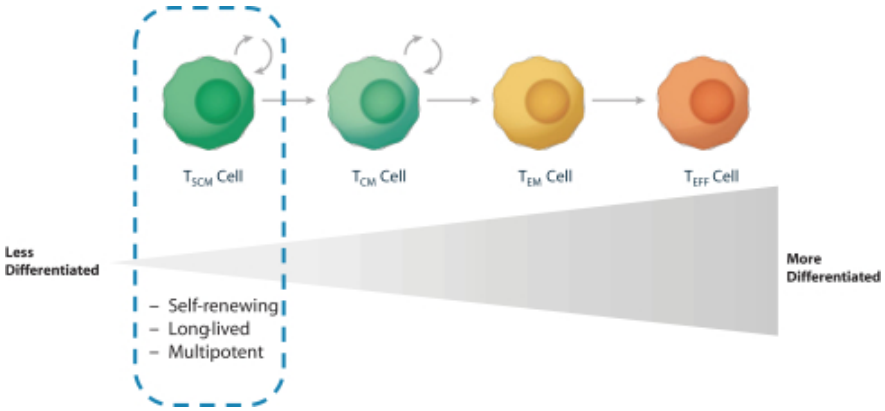
Despite these response rates, there are several key limitations to early-generation CAR-T products, including duration of response, the ability to treat solid tumors and safety concerns, which we believe have thus far curtailed broader adoption. We believe these limitations are the result of early-generation CAR-T products being predominantly comprised of short-lived differentiated T cells. The duration of response with early-generation CAR-T therapies is often limited because more differentiated T cells do not persist long term in the body. CAR-T has also historically been ineffective in treating solid tumors, apart from a few cases involving numerous repeat administrations, consistent with a hypothesis that early-generation products lack the persistence needed to have a clinical impact on these tumors. Additionally, when differentiated CAR-T cells are infused they begin releasing cytokines and other molecules, which can lead to severe toxicities including cytokine release syndrome, or CRS, and neurotoxicity, either of which can be fatal. This toxicity profile may limit the ability of early-generation CAR-T therapies to be administered in community hospitals and outpatient infusion sites.

T cell engineering is typically achieved via viral transduction, the process of introducing foreign DNA into a cell using a virus, most notably with retroviruses, such as g-retrovirus or lentivirus. Despite extensive optimization of these viral vectors, their limitations are becoming more evident, including safety concerns regarding the insertional profile, limited genetic cargo capacity, and an undesirable phenotype of the final CAR-T product. We use our proprietary non-viral piggyBac DNA Modification System to deliver CAR-containing genes to T cells. The most significant advantage of using a non-viral approach is the ability to generate CAR-T products comprised of a high percentage of early memory T cells, such as T_{SCM} cells. We believe this has the potential to result in therapies that elicit more consistent and durable responses with less toxicity. Additionally, we believe our non-viral approach will have much lower manufacturing costs and shorter manufacturing timelines.

Not all T cells are created equally

Unlike other CAR-T approaches using lentivirus, our proprietary piggyBac DNA Modification System is able to create a product with a high percentage of T_{SCM} cells. There is a one-way differentiation pathway from T_{SCM} cells to central memory T cells, or T_{CM}; then to effector memory T cells, or T_{EM}; and lastly, to effector T cells, or T_{EFF}. As T cells mature and differentiate, their core functions and capabilities change, impacting their potency and durability. Our approach is to utilize a high percentage of less differentiated T cells in our product candidates with the goal of increasing persistence and mitigating some of the key limitations of early-generation CAR-T products.

The following figure illustrates this directional T cell differentiation pathway, from T_{SCM} cell to T_{EFF} cell:



A single T_{EFF} cell can kill multiple target cells in a highly specific manner, and it is this function that gives CAR-T therapeutics their remarkable properties when compared with prior oncology treatment modalities. In particular, T_{EFF} cells typically kill only target cells without impacting healthy cells. However, T_{EFF} cells are short-lived, generally lasting only days to weeks, so a patient treated with a CAR-T product comprised of predominantly fully differentiated T cells, such as T_{EFF}, will likely experience relapse unless the initial dose of CAR-T cells is capable of eliminating every cancer cell in the body during their short lifespan in the patient.

In contrast, T_{SCM} cells are long-lived, self-renewing and multipotent, with the capacity to reconstitute the entire spectrum of memory and T_{EFF} cell subsets. T_{SCM} cells survive for decades, and potentially for entire human lifespans, and are responsible for providing lifelong T cell immunity against some infectious agents. We believe T_{SCM} cell longevity, their ability to self-renew, and their robust proliferative potential make them an ideal cell population in adoptive immunotherapy. In a retrospective analysis of CAR-T clinical results, complete responses were correlated with the percentage of T_{SCM} cells in the pre-manufactured patient material. In a separate CAR-T clinical trial, responses were correlated with persistence of CAR-T product in vivo. The persistence of CAR-T product in vivo was in turn correlated with the amount of T_{SCM} cells in the product.

We believe our proprietary approach, combining an advanced manufacturing method with a sophisticated gene engineering platform, addresses the primary challenges of early-generation CAR-T therapies in the following ways:

Duration and Activity

Durable responses. Our piggyBac manufacturing method results in product candidates with a high percentage of less differentiated early memory T cells, including the highly desirable T_{SCM} cells. T_{SCM} cells engraft in the patient's body and are long-lived, self-renewing and available to re-respond to future relapses, which we believe has the potential to result in a lifetime durable response.

Response in solid tumors. T_{SCM} cells have the unique ability to produce a potentially unlimited number of T_{EFF} cells, generating multiple waves of CAR-T responses with only a single administration of product. P-PSMA-101 resulted in the elimination of tumor cells to undetectable levels in 100% of animals in a preclinical model of prostate cancer. P-PSMA-101 was evaluated using two different established tumor models. Both studies used intact, male immuno-deficient NOD scid gamma mice. First, P-PSMA-101 was tested in an established LNCaP tumor model where human tumor cells were injected subcutaneously high in the axilla. After approximately 17 days, mice were stratified into treatments arms based on tumor size via caliper measurement. Only mice bearing established, palpable tumors were treated. The first study was a dose range study, where mice were dosed intravenously with various doses of P-PSMA-101 cells (5×10^6 (n=3), or 10×10^6 (n=3)) or saline (no T cells; n=4). The predetermined duration of the study was planned until the last control vehicle mouse succumbed to LNCaP tumor burden, which occurred at Day 42 of the study. Treatment with 5×10^6 or 10×10^6 P-PSMA-101 cells resulted in 100% clearance of tumor in all animals by day 14, with no evidence of disease by caliper and bioluminescence imaging. To our knowledge based on published literature, no other product candidate has shown complete solid tumor elimination in any animal in this same preclinical model.

Tolerability

More gradual killer. CAR-T products comprised of a high percentage of T_{SCM} cells are more gradual killers of tumor cells, which we believe can effectively dampen the rapid release of cytokines as seen in early-generation CAR-T products containing predominantly differentiated T cells, potentially resulting in a significantly higher therapeutic index, meaning a limited change in toxicity relative to increased dose.

Pure product candidates. We use our proprietary positive selection method to create product candidates that are comprised of essentially 100% CAR-positive cells, thereby minimizing one of the potential sources of CAR-T toxicity. Early-generation products do not utilize positive selection and typically contain a significant number of CAR-negative cells, which cannot kill cancer cells but may contribute to toxicity because they are artificially activated and expanded outside of the body.

Scalability

Allogeneic capability. We intend to use Cas-CLOVER, our proprietary site-specific gene editing platform, to develop allogeneic CAR-T product candidates, with the goal of further revolutionizing treatment by enabling administration of drug, derived from a single healthy donor and created in a single manufacturing run, to potentially hundreds or thousands of patients.

Versatility. Our proprietary non-viral piggyBac DNA Modification System allows us to insert multiple CARs and/or T cell receptors, or TCRs, as well as other genes into T cells simultaneously. This significantly increases the number of potential indications we can target and, therefore, the number of future product candidates in our pipeline. Additionally, the ability to insert positive selection and safety switch genes alongside CAR molecule genes has the potential to address the tolerability limitations that have precluded administration of early-generation CAR-T products in community hospitals and outpatient infusion sites.

Our CAR-T Pipeline

The following table summarizes our CAR-T oncology product candidate portfolio:

Candidate	Indication(s)	IND-Enabling	Phase 1	Phase 2	Phase 3*	Anticipated Next Milestone	Ownership
P-BCMA-101 *Autologous CAR-T*	Multiple Myeloma					Initiate Potential Registrational Trial 1H 2019	POSEIDA THERAPEUTICS
P-PSMA-101 *Autologous CAR-T*	Prostate Cancer					File IND 2H 2019	POSEIDA THERAPEUTICS
P-BCMA-ALLO1 *Allogeneic CAR-T*	Multiple Myeloma					File IND Late 2019 or Early 2020	POSEIDA THERAPEUTICS
P-MUC1C-101 *Autologous CAR-T*	Multiple Solid Tumors					File IND 2020	POSEIDA THERAPEUTICS

**Phase 3 may not be necessary if Phase 1/2 can serve as a registrational clinical trial. The FDA has not indicated whether Phase 3 clinical trials will be required for any of our product candidates.*

P-BCMA-101. Our lead product candidate is an autologous CAR-T therapy being developed to treat patients with relapsed/refractory multiple myeloma. P-BCMA-101 targets cells that express B cell maturation antigen, or BCMA, which is expressed on essentially all multiple myeloma cells. P-BCMA-101 is engineered with our non-viral piggyBac manufacturing method, resulting in a high percentage of T_{SCM} cells. Preliminary results from our ongoing Phase 1 clinical trial of P-BCMA-101 showed that as of November 21, 2018, of the 19 patients that were evaluable, 14 had meaningful responses, with an ORR of 100% in three evaluable patients that had received the planned Phase 2 dose of P-BCMA-101. In addition, as of November 21, 2018, P-BCMA-101 continued to be well tolerated in the trial, with two mild and transient instances of CRS observed, and one patient with possible neurotoxicity, each of which occurred at doses below the planned Phase 2 dose. We continue to enroll patients in, and intend to use the data from, this trial to meet with the FDA in early 2019 to discuss our plan to initiate a Phase 2 clinical trial in the first half of 2019.

P-PSMA-101. P-PSMA-101 is an autologous CAR-T product candidate being developed with the goal of enabling treatment of patients with CRPC. P-PSMA-101 targets cells that express prostate-specific membrane antigen, or PSMA, which is expressed on most prostate cancer cells. P-PSMA-101 also utilizes our piggyBac manufacturing method, resulting in a high percentage of T_{SCM} cells. P-PSMA-101 has demonstrated elimination of tumor cells to undetectable levels in 100% of animals in a preclinical model of prostate cancer. To our knowledge based on published literature, no other product candidate has shown complete solid tumor elimination in any animal in this preclinical model. P-PSMA-101 is currently undergoing IND-enabling activities and we anticipate an IND filing and initiation of a Phase 1 clinical trial in the second half of 2019.

P-BCMA-ALLO1. P-BCMA-ALLO1 is an allogeneic, or universal donor, CAR-T product candidate using well-characterized cells derived from a healthy donor as starting material and is being developed with the goal of enabling treatment of potentially hundreds or thousands of patients with multiple myeloma from a single manufacturing run. Doses could be cryopreserved and stored at treatment centers for future off-the-shelf use. P-BCMA-ALLO1 utilizes our proprietary Cas-CLOVER gene editing technology to reduce or eliminate alloreactivity. We anticipate an IND filing and initiation of a Phase 1 clinical trial for P-BCMA-ALLO1 by late 2019 or early 2020.

P-MUC1C-101. P-MUC1C-101 is an autologous CAR-T product candidate in late-stage preclinical development for multiple solid tumor indications. We believe P-MUC1C-101 has the potential to treat a wide range of solid tumors, particularly common cancers derived from epithelial cells, such as breast, colorectal, lung, ovarian, pancreatic and renal cancers, as well as other cancers expressing a cancer-specific form of the Mucin 1 protein, or MUC1C. P-MUC1C-101 has shown the elimination of tumor cells to undetectable levels in a preclinical model of breast cancer. We anticipate an IND filing and initiation of a Phase 1 clinical trial for P-MUC1C-101 in 2020.

Our Proprietary Technologies

We have developed a proprietary suite of technologies that we believe capitalizes on the benefits of T_{SCM} cells. Our primary differentiating technologies include:

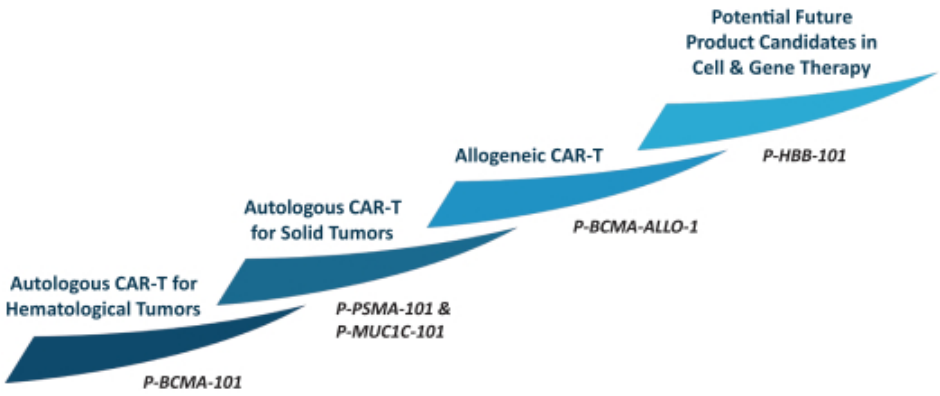
- ***Ability to Increase Percentage of T_{SCM} Cells***. We believe our ability to generate CAR-T product candidates that are comprised of a high percentage of T_{SCM} cells will provide the potential to increase duration of response, possibly allow for re-response and lead to a more gradual production of T_{EFF} cells, thereby reducing toxicity and the requirement for an intensive care unit at treatment sites.
- ***Non-Viral Gene Insertion***. Our proprietary piggyBac DNA Modification System is highly efficient and has a significantly larger genetic cargo capacity compared to viral methods. As a result, our product candidates can contain transgenes large enough to include multiple CAR and/or TCR molecule genes, a selection gene, a safety switch gene, and potentially other cargo as needed for specific treatment applications, potentially making it more flexible.
- ***Gene Editing with Precise Specificity***. Our proprietary, highly precise Cas-CLOVER gene editing technology has shown little to no off-target activity in our preclinical studies and we believe it can efficiently edit resting T cells, allowing for the maintenance of T_{SCM} product composition in allogeneic product candidates.
- ***Additional Proprietary Tools***:
  - *Positive selection*. We create product candidates utilizing a fully-human drug resistance gene that can be employed during manufacturing to create a purified product that is essentially 100% CAR-positive, minimizing one of the sources of CAR-T toxicity and thereby potentially enhancing the therapeutic index.
  - *iCasp9-based safety switch*. We have developed a proprietary safety switch comprised of fully-human genes that can be activated by administration of a small molecule and thereafter has the potential to rapidly eliminate some or all administered CAR-T cells in the patient.
  - *Booster molecules*. We have developed an approach that enables improved expansion of gene-edited allogeneic cells without affecting their desirable T_{SCM} characteristics.
  - *CAR Binding libraries*. Instead of traditional single chain variable fragment, or scFv, binders, we utilize novel binder technologies which we believe are stable, do not result in tonic signaling and result in low to no immunogenicity.

Our Strategy

Our mission is to develop cell and gene therapies with the capacity to cure.

We intend to develop and commercialize novel cell and gene therapy products by using our broad gene engineering platform technologies to treat patients with high unmet medical need, initially focusing on CAR-T product candidates for oncology indications. We plan to pursue our mission through the following strategies:

- ***Rapidly develop and commercialize novel CAR-T therapies targeting hematological malignancies.*** We developed P-BCMA-101, a product candidate for patients with relapsed/refractory multiple myeloma, which is one of the more challenging hematological malignancies to treat, in order to showcase the advantages of our proprietary platform technologies. At the 2018 meeting of the American Society of Hematology, we presented data from our on-going Phase 1 clinical trial of P-BCMA-101. Based on these early results, we plan to continue pursuing development and commercialization of P-BCMA-101 and broaden our pipeline into other hematological indications. Over time, we plan to develop our product candidates in earlier lines of treatment and other hematological malignancies and will seek to commercialize in community hospital settings, and eventually in outpatient infusion sites.
- ***Leverage the strength and breadth of our platform technologies to develop CAR-T therapies in solid tumors.*** Our platform technology is designed to address the historical CAR-T limitations in treating solid tumors, which result from the lack of product persistence needed to have a clinical impact on these indications. We are initially focused on developing P-PSMA-101 for the treatment of CRPC, given the significant unmet medical need for this indication. In a preclinical model of CRPC, widely recognized as aggressive and difficult to treat, P-PSMA-101 demonstrated 100% elimination of engrafted and well-established solid tumors after a single dose. Based on these data, we plan to rapidly develop, and if approved, commercialize P-PSMA-101. Additionally, we plan to develop P-MUC1C-101 for multiple solid tumor indications and generate other solid tumor product candidates.
- ***Utilize our proprietary next-generation gene editing capabilities to develop allogeneic CAR-T products.*** Our lead allogeneic product candidate, P-BCMA-ALLO1, was designed to demonstrate our ability to develop a universal donor product candidate that has the same inherent properties and functions of our autologous anti-BCMA product candidate, P-BCMA-101. We plan to rapidly develop, and if approved, commercialize P-BCMA-ALLO1 and eventually develop an allogeneic version of all of our hematological and solid tumor product candidates.
- ***Fully exploit the versatility and scalability of our technology and capabilities beyond CAR-T for oncology.*** Our platform technologies have the potential to generate a broad array of future product candidates to treat a multitude of indications outside of oncology. For example, P-HBB-101, a non-CAR-T product candidate, is in early preclinical development for sickle cell disease.



Our Team

We have assembled an experienced and highly qualified management team with deep expertise in cell and gene therapy and a successful record of building and growing biotechnology companies. Our Chief Executive Officer, Eric Ostertag, Ph.D., M.D., was the first graduate from the Gene Therapy Program at the University of Pennsylvania and has over 20 years of experience in cell and gene engineering, founding multiple biotechnology companies, including Transposagen Biopharmaceuticals, Inc. Dr. Ostertag served as Transposagen's Chief Executive Officer for 13 years, developing next-generation genetic engineering technologies that were eventually spun out to create Poseida Therapeutics, Inc. in early 2015. We are also supported by a veteran group of life science investors including Longitude Capital, Vivo Capital, Boxer Capital and Malin Corporation.

History of CAR-T

Increased understanding of cancer biology and cancer genetics has led to paradigm shifts and entirely new categories of treatment modalities for cancer. However, until recently, all of the major modalities including radical surgery, radiation and chemotherapy shared the same problem: they killed cancer cells, but not without damaging healthy cells and tissues. Immuno-oncology is the concept of using the patient's own immune system to attack cancer, and it has the potential to eliminate the greatest challenge for all prior cancer treatment modalities by specifically killing cancer cells without harming healthy cells and tissues.

A person's adaptive immune system is responsible for recognizing and eliminating a number of threats to the body, such as infectious agents, as well as infected and abnormal cells. One crucial component of the adaptive immune response is the T cell. T cells are specialized white blood cells capable of detecting and killing infected and abnormal cells that also act to signal other immune cells to respond to threats. Recognition of an infected or abnormal cell occurs through TCRs on the surface of T cells, which are tailored to recognize specific foreign molecules on the surface of other cells. A human body contains billions of distinct T cells with millions of specific TCRs capable of recognizing a vast array of potential foreign targets.

There are several characteristics of T cells that make them ideally suited for immuno-oncology applications. First, they are exceptionally good at killing, as a single T cell can kill numerous target cells. Second, they are extremely specific killers, able to kill an infected cell and ignore an almost identical uninfected healthy cell. T cells normally eliminate some potential cancers from the body before they can become established. However, certain genetic mutations in cancers can allow the cancer cell to evade killing by T cells. If a T cell could be re-educated to kill cancer cells through genetic modification, it could then potentially be used as a very potent and non-toxic immunotherapy. This is the concept behind CAR-T therapies.

CAR-T therapy has recently emerged as a revolutionary and potentially curative therapy for patients with hematologic cancers, including those that have become heavily refractory to standard therapy. In autologous CAR-T therapy, T cells are removed from the body, engineered with receptors specific to cell surface targets on the patient's tumor cells, and administered back into the body. Once the engineered T cells are administered, they are able to recognize and kill the tumor cells that express the target for the engineered receptor.

In 2017, two autologous anti-CD19 CAR-T cell therapies, Yescarta, developed by Kite Pharma, Inc., and Kymriah, developed by Novartis International AG, were approved by the FDA for the treatment of relapsed/refractory large B-cell lymphoma (Yescarta) and relapsed/refractory B-cell precursor acute lymphoblastic leukemia (Kymriah). These therapies have received breakthrough designations from the FDA and have shown high response rates with prolonged treatment effects for a subset of patients. However, there remains much room to improve efficacy, duration of response and safety.

Addressing the Limitations of Early-Generation CAR-T Therapies

Although early-generation CAR-T therapy has shown significant potential, there are a number of limitations. The great majority of early-generation and current CAR-T therapies are produced using viral-based

manufacturing. We believe that there are a number of inherent problems related to viral-based manufacturing that cause the limitations of other CAR-T therapies. T cell engineering is typically achieved via viral transduction, the process of introducing foreign DNA into a cell using a virus, most notably with retroviruses, such as g–retrovirus or lentivirus.

Despite extensive optimization of these viral vectors, their limitations are becoming more evident, including safety concerns regarding the insertional profile, limited genetic cargo capacity, and an undesirable phenotype of the final product. We use our proprietary non-viral piggyBac DNA Modification System to deliver CAR molecule genes to T cells. The most significant advantage of using a non-viral approach is the ability to generate CAR-T products comprised of a high percentage of T_{SCM} cells. We believe this has the potential to result in therapies that elicit more consistent and durable responses with less toxicity. Additionally, we believe our non-viral approach will have much lower manufacturing costs and shorter manufacturing timelines.

CAR-T in Liquid Tumors

Early-generation CAR-T therapeutics have demonstrated an ability to achieve impressive responses in hematologic malignancies, even in pre-treated patients who are relapsed and/or refractory to prior lines of standard therapies. Dramatically higher response rates than those reported for all prior therapeutics have been achieved in some indications, with some patients likely being cured. Despite these outcomes, however, a significant number of patients have relapsed after receiving CAR-T therapy and duration of response has generally been poor.

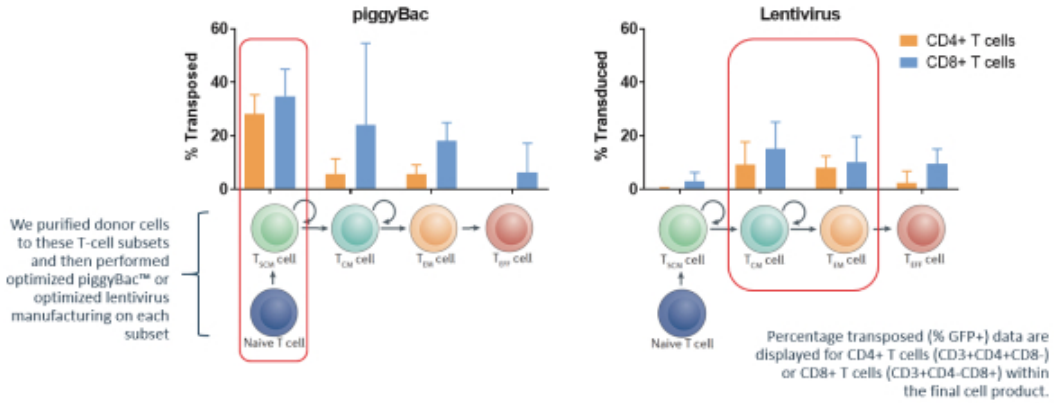
There are several potential reasons for the poor duration of response, which generally fall into two categories: elimination of the CAR-T cells from the body and loss of expression of a CAR-T target on a tumor cell, known as antigen escape. Another major limitation of early-generation CAR-T therapies is the potential for severe toxicity, most notably CRS and neurotoxicity, either of which can be fatal. Lastly, there remains significant manufacturing and commercial scalability challenges ahead for other CAR-T candidates, mainly due to the nature of viral-based manufacturing.

Efficacy Challenge: Elimination of CAR-T Cells

Early-Generation Challenges	Poseida's Technologies	The Potential Benefits of Poseida's Approach
Poor Duration of Response *Due to poor persistence in the patient*	• **piggyBac non-viral manufacturing** • **T_{SCM} cells** • **Fully-human binders and other components**	• Product comprised primarily of **early memory cells**, including T_{SCM} cells are more likely to engraft and are **self-renewing and long-lived** • High percentage of T_{SCM} cells potentially enabling **relapse control and longer duration of response** • **No tonic signaling or T cell exhaustion** from Poseida fully-human binding molecules observed to date • **Low or no immunogenicity** from any Poseida binding molecules or other fully-human components

There are numerous explanations as to why CAR-T cells are eliminated from a patient after administration, but we believe the primary explanation is that the majority of T cells in other CAR-T products are more differentiated and short-lived T cells, including T_{EFF} cells. It is our belief that not all T cells are created equally, and the ability to develop a product that consists predominantly of early memory T cells, particularly T_{SCM} cells, is the key to increasing duration of response and tolerability. Our non-viral piggyBac manufacturing method is the only commercially viable approach known to us that can create CAR-T products with a high percentage of the highly desirable T_{SCM} cells.

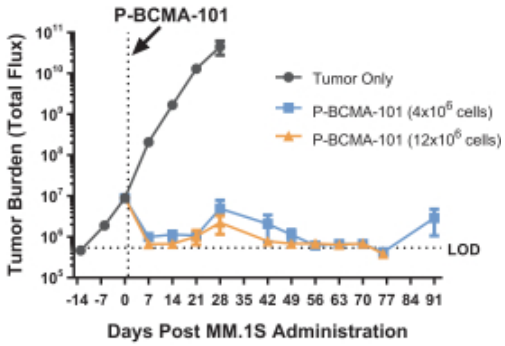
In order to test the ability of our piggyBac DNA Modification System to preferentially deliver CAR-containing transgenes to T_{SCM} cells, we conducted a preclinical experiment in which we separated T cells into their various subtypes, then individually put those subsets through either an optimized piggyBac manufacturing process or an optimized lentivirus process and measured the percentage of transposed or transduced cells in each subset. As shown in the figures below, piggyBac was very efficient at transposing (the piggyBac process of delivering the CAR-containing transgene) in T_{SCM} cells, while lentivirus was relatively ineffective at transducing (the lentiviral process of delivering the CAR-containing transgene) in T_{SCM} cells. We measured both CD4+ T cells (also known as T helper cells) and CD8+ T cells (also known as cytotoxic T cells) which represent two subsets of T cells believed to interact and be important in immune function and T cell response.



Given the uni-directional differentiation pathway of T cells, we believe utilizing a genetic engineering method that preferentially modifies T_{SCM} cells is essential for creating a final product with a high percentage of T_{SCM} cells. Once we have completed the genetic modification step, we then perform a positive selection step to eliminate cells that have not been modified. Lastly, we activate and expand the remaining cells under conditions that favor self-renewal of T_{SCM} cells without differentiation, resulting in a product that has a high percentage of T_{SCM} cells, even when starting with patient material with a relatively low percentage of T_{SCM} cells. Our non-viral piggyBac DNA Modification System typically yields T_{SCM} cell percentages reaching as high as 80%. We compared our piggyBac manufacturing method to a lentivirus-based manufacturing method that utilizes alternative media (Aim V, Thermo Fisher Scientific), different T cell stimulation (CD3/CD28 beads from Dynal/Thermo Fisher Scientific) and virus for vector integration (lentivirus). The results of the comparisons of these two methods indicate that the process using the piggyBac DNA Modification System yields a greater frequency of CD8+ T_{SCM} (61% to 78%, with a median of 70%) than the standard lentivirus process (5.5% to 31%, with a median of 29.6%). The sorted T cell subsets were put through the piggyBac process once in a pilot experiment with cells from one donor, and again in a comparison with the lentivirus process with cells from three donors. The early memory component, or combined T_{SCM} and T_{CM} cells, typically comprise greater than 90% of the cells of our product candidates.

Others in the field of CAR-T development are also attempting to increase the percentage of T_{SCM} cells in their products through alternative methods during the manufacturing process, including the addition of small molecule inhibitor drugs and various cytokines, reducing the time in culture, and physically enriching through sorting methods for early T cells. However, we believe these methods all have inherent problems that will limit the ability to successfully create a final product candidate with a high percentage of T_{SCM} cells.

Since T_{SCM} cells in CAR-T products have been shown to correlate with clinical response, and our CAR-T product candidates contain a high percentage of T_{SCM} cells, our goal is that our product candidates will overcome the limitations of other CAR-T products in many respects, including durability of response. The importance of these cells can be seen in a preclinical model in which mice are implanted with a highly aggressive human multiple myeloma cell line (MM.1S). In this model, P-BCMA-101 engrafted with marked persistence in vivo, and remarkably, was able to control relapses without re-administration of product, as shown in the chart below:



More fully differentiated T cells, which already have a short lifespan compared with T_{SCM} cells, can be eliminated abruptly from the patient, leading to poor efficacy of the product. One reason for premature loss of CAR-T occurs if the cells have CAR binding molecules that interact with each other on the surface of the cell. This results in crosslinking of the CAR molecule and a phenomenon called tonic signaling, a state in which the CAR-T cells are essentially always active. Tonic signaling, in turn, results in premature loss of efficacy and cell death, referred to as T cell exhaustion. We use binding molecules, such as Centyrins and heavy chain only antibodies (VH), that are unable to crosslink and are resistant to tonic signaling.

Premature loss of CAR-T can also occur when the patient develops an antibody response against the CAR-T product itself. A patient can have an immune reaction if the CAR-T contains components that are not human, as when using a binder created in mice. Our binders are based upon fully-human components, which we believe make them non-immunogenic. Furthermore, all of our other CAR-T components are based on fully human sequences, and therefore we believe are less likely to cause a patient immune response.

Efficacy Challenge: Antigen Escape

Early-Generation Challenges	Poseida's Technologies	The Potential Benefits to Poseida's Approach
Poor Duration of Response *Due to antigen escape*	• **Posieda target selection** • **piggyBac non-viral manufacturing**	• Targets likely **less susceptible to antigen escape** • **Ability to deliver multiple CAR or other molecules** on same cell to increase number of targets

Some CAR-T products have been shown to lose efficacy due to what is called antigen escape, which occurs when expression of a CAR-T target on a tumor cell is lost or drastically reduced, resulting in an expansion of the tumor cells that have escaped the ability of the CAR-T to kill them. To avoid antigen escape, we have focused our efforts on selecting targets where we believe expression is less likely to be reduced. For example, BCMA is important for cell proliferation, and so is considered less likely to be lost by the tumor cell following CAR-T treatment.

Another method to prevent antigen escape involves pursuing multiple targets on the cancer cell with the same CAR-T product. The likelihood that a cancer cell will be able to simultaneously downregulate or lose

expression of multiple targets, as opposed to any single target, is greatly reduced. While the genetic cargo capacity of viral vectors is quite limited, piggyBac has demonstrated the ability to deliver greater than 20 times more genetic cargo, allowing transfer of multiple CAR molecule genes simultaneously. In the future, we believe the large genetic cargo capacity of piggyBac could allow us to further address antigen escape by including two or more CARs or TCRs on the same T cell.

Safety

Early-Generation Challenges	Poseida's Technologies	The Potential Benefits to Poseida's Approach
Significant Toxicity *CRS and neurotoxicity*	• **T_{SCM} cells** • **piggyBac non-viral manufacturing** • **Positive selection** • **iCasp9-based safety switch**	• **T_{SCM} cells differentiate more slowly** into effector cells resulting in more gradual killing and **significantly less toxicity and greater therapeutic index** • Positive selection results in pure product with greater therapeutic index – essentially **100% CAR-positive** • **Non-oncogenic** and low to no mutagenesis • **Safety Switch** allows rapid elimination of some or all CAR-T cells if desired

The excitement over the impressive responses seen initially with early-generation CAR-T approaches has unfortunately been tempered by potentially life-threatening toxicities, most notably CRS and neurotoxicity. As more is being understood about these toxicities, it is now appreciated that they may be caused by different molecular mechanisms. However, both are rooted in a T cell response that is essentially too rapid and too strong. The CAR-T cells and other immune cells of the patient release cytokines and other molecules that initiate immune cascades that can be fatal if not done in a controlled manner.

T_{SCM} cells express fewer cytotoxic effector molecules than more differentiated T cells and are postulated to differentiate and develop cytotoxic capability gradually. We believe the T_{SCM} cell phenotype may lead to a more controlled expansion of CAR-T and more gradual killing of tumor cells, thereby lessening the severity of toxicities, such as CRS and neurotoxicity, and resulting in a CAR-T product with a greater therapeutic index.

A second safety feature incorporated into our CAR-T product candidates is the positive selection for CAR-positive cells during the manufacturing process. Drug resistance genes have been employed in other cellular therapeutics as a mechanism for selecting and purifying gene-modified cells to improve the efficiency of gene therapy. Our product candidates are engineered to express a variation of the human dihydrofolate reductase, or DHFR, gene. Cells containing this variant of the DHFR gene are slightly resistant to the drug methotrexate, or MTX. The advantage of DHFR over other drug-resistance strategies is that MTX is not genotoxic and preferentially kills dividing cells. Importantly, this gene-drug combination has been previously demonstrated to permit ex vivo selection of genetically modified T cells with relatively low concentrations of MTX.

Additionally, we enrich for gene-modified CAR-positive cells during ex vivo expansion, thereby purifying the therapeutic product and controlling for any patient-to-patient variability in raw material or manufacture, making our CAR-T product candidates essentially 100% CAR-positive. This contrasts with competing products that do not utilize positive selection and typically contain a significant number of CAR-negative cells that cannot kill cancer cells but are artificially activated and expanded outside of the body and may contribute to CRS and/or neurotoxicity. Thus, we believe that positive selection is another mechanism, in addition to the high percentage of T_{SCM} cells, that may result in our CAR-T product candidates having a significantly greater therapeutic index.

Given that every CAR-T cell has a transgene, which is stably integrated into the genome, there is the possibility that the transgene delivery part of the CAR-T manufacturing process could create a detrimental

mutation that allows the cell to expand in an uncontrolled manner, which can result in the cell itself becoming cancerous. Additionally, in the case of viral-manufacturing, some viral component that is integrated into the CAR-T cell as part of the transgene, such as the long terminal repeats, or LTRs, of the transgene may be able to activate a gene already in the cell, resulting in the cell becoming cancerous, a process called oncogenesis.

Although a transformation event has yet to be documented in any CAR-T product, there has been an example of a clonal expansion in a patient who received a CAR-T product made from lentivirus. A clonal expansion means that a single T cell was given a proliferative advantage and was able to grow to 100% of all the CAR-positive cells in the patient. In this case, the clonal expansion was caused by the lentivirus inserting into a gene important for proliferation.

Our CAR-T product candidates utilize our proprietary piggyBac technology. PiggyBac has shown low integration into intragenic regions, meaning that it is less likely to cause a detrimental mutation. Also, unlike retroviruses, piggyBac does not contain LTR sequences, but rather inverted terminal repeat sequences, or ITRs, which act as strong insulators, enhancing stable transgene expression and lowering risk of oncogenesis.

We have included a cellular safety switch in each of our product candidates as an additional safety mechanism. Both CRS and neurotoxicity are thought to be related to an overactive T cell response. Therefore, timely intervention to diminish the number of CAR-T cells should be an effective method of managing the majority of adverse events. We believe an ideal intervention technique is one that could be titrated such that not all CAR-T cells would be eliminated, leaving some for continued therapeutic effect.

A recently validated class of cellular safety switches called the inducible caspase 9, or iCasp9, system has the potential to mitigate the risks of CAR-T cell therapy by enabling the rapid elimination of some or all administered T cells, if desired. An iCasp9-based safety switch has been used successfully in the field of hematopoietic stem cell, or HSC, transplantation to rapidly eliminate modified T cells in the event of graft-versus-host disease, or GvHD.

Our proprietary iCasp9-based safety switch gene is constructed of fully human sequences, so we do not expect it to be immunogenic. The iCasp9 sequence consists of a drug-binding domain coupled to the signaling domain of caspase-9, an enzyme that is part of the apoptotic pathway. The induction of our iCasp9-based switch depends on the subsequent administration of the drug rimiducid (a generic version of AP1903), which rapidly induces apoptosis in cells expressing the normally inert iCasp9-based safety switch protein. Based on our preclinical studies and clinical trials of other product candidates using a similar safety switch, we believe induction of the switch is kinetically favorable, resulting in apoptosis of cells containing the iCasp9-based safety switch protein within minutes to hours after rimiducid administration, and can be titrated to eliminate some or all of the genetically modified T cells.

Commercial Scalability

Early-Generation Challenges	Poseida's Technologies	The Potential Benefits to Poseida's Approach
Costly Manufacturing and Commercialization *Viral-based CAR-T therapies are expensive to manufacture and safety concerns may limit commercial reach*	• **piggyBac non-viral manufacturing** • **Additional manufacturing cost savings** • **T_{SCM} cells**	• **Manufacturing cost benefits** – **Non-viral:** no need for costly and time-consuming GMP virus manufacture – GMP DNA and RNA materials are **low cost** and easy to produce – No need for magnetic beads or exogenous cytokines • **Better tolerability** may enable **broader commercial reach** to community hospitals and infusion centers

Another challenge with early-generation CAR-T products is their commercial scalability. Autologous CAR-T products are, by definition, individualized products. They are also typically expensive to produce, particularly when using viral-based manufacturing methods. We believe our non-viral piggyBac approach is more efficient and cost effective than historical CAR-T methods as it utilizes GMP nucleic acids, DNA and RNA, which are faster and cheaper to produce than GMP virus. We have further optimized the manufacturing process to eliminate some of the costly materials associated with the viral-based methods, including magnetic beads and cytokines.

CAR-T products that elicit severe and potentially fatal toxicities, such as CRS and neurotoxicity, require that the drug be administered in a tertiary care hospital where the physicians are familiar with treating these toxicities and where admission to an intensive care unit is an option. The potential for these severe toxicities currently precludes administration in community hospitals or outpatient infusion centers. Because our approach has the potential to improve on these attributes, it is possible that our CAR-T product candidates could eventually be administered at community hospitals or outpatient infusion centers, thereby greatly expanding patient access. In our dose-escalation Phase 1 clinical trial, as of , 2018, there have been no toxicities that have resulted in admission of patients to intensive care units.

CAR-T in Solid Tumors

Early-Generation Challenges	Poseida's Technologies	The Potential Benefits to Poseida's Approach
Efficacy and Safety in Solid Tumors	• **T_{SCM} cells** • **Novel binders** • **piggyBac non-viral manufacturing**	• **Key to efficacy in solid tumors** - T_{SCM} cells engraft and differentiate to hit tumors with **multiple waves of effector cells** • **Tumor-specific** binding molecules • **Ability to deliver multiple CAR or other molecules** on same cell to increase specificity

Efficacy Challenge

In addition to the standard concerns regarding persistence of T cells in the treatment of hematologic malignancies, there are factors that exacerbate this problem when using CAR-T products for the treatment of solid tumors. To date, the great majority of early-generation CAR-T products have not demonstrated significant responses in solid tumors and there are a number of potential explanations for this poor efficacy. First, it is possible that CAR-T cells have more difficulty accessing solid tumor cells. In some diseases, such as acute lymphoblastic leukemia, the tumor cells are easily accessible by the CAR-T cells. However, in most solid tumors, there are a number of factors that may make it more difficult for CAR-T cells to access the tumor. Second, it is possible that solid tumor cells have changes in expression of certain checkpoint genes that render them resistant to killing by T cells. Third, the center of many solid tumors is very hypoxic, or low in oxygen concentration, and this environment is not thought to be conducive to T cell function.

There have been a few exceptions to the poor efficacy of CAR-T in solid tumors, notably in glioblastoma multiforme and hepatocellular carcinoma, where treatment with CAR-T has led to complete responses in solid tumors. In these rare cases, the patient was treated with numerous administrations of CAR-T product. Though CAR-T cells are not as effective against solid tumor cells as they are against liquid tumor cells, this can potentially be overcome by giving multiple administrations of CAR-T, resulting in numerous waves of more differentiated T cells killing the cancer cells. This approach would be more viable if there were an unlimited number of cells with which to treat the patient. However, manufacturing early-generation CAR-T products is relatively time consuming, expensive, and the final product is comprised of a limited number of cells, thereby making this approach impractical for many patients.

All of our solid tumor product candidates, including P-PSMA-101 and P-MUC1C-101, are comprised of a high percentage of T_{SCM} cells, which we believe are able to engraft and differentiate into wave after wave of more differentiated T cells. Therefore, we believe our CAR-T product candidates will be able to achieve high rates of response against solid tumors with a single administration. P-PSMA-101 resulted in the elimination of tumor cells to undetectable levels in 100% of animals in a preclinical model of prostate cancer. To our knowledge based on published literature, no other product candidate or already approved cancer therapeutic has shown complete solid tumor elimination in any animal in this preclinical model.

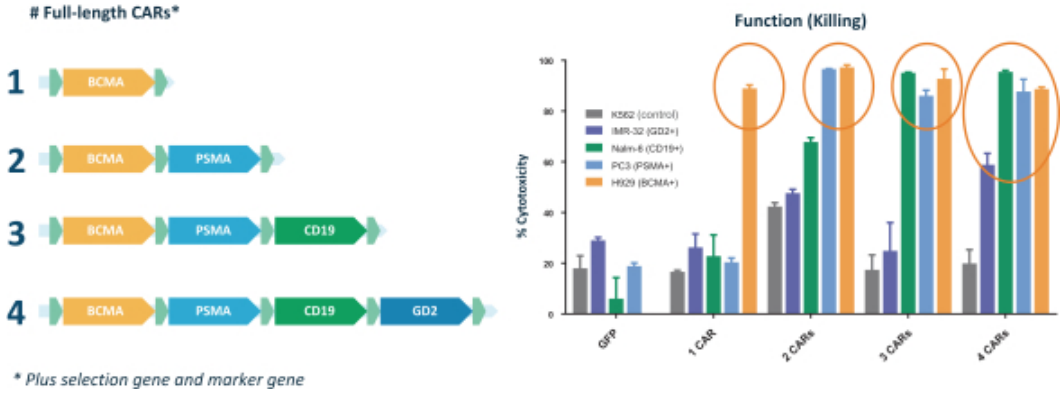
Safety

Our solutions addressing the toxicity concerns regarding CRS and neurotoxicity with respect to hematological tumors also apply to solid tumors. However, there are additional toxicity concerns for CAR-T products when administered to treat solid tumors. When compared to hematological tumors, solid tumors generally have fewer unique surface targets that are not also expressed on healthy cells, so greater care must be taken when choosing targets to avoid on-target/off-tumor toxicity, which occurs when a CAR-T cell recognizes the intended target on a healthy cell and kills that cell. We seek to address this risk by choosing targets that are overexpressed in cancer cells, such as PSMA and MUC1C, and by using binding molecules that we believe are more effective at binding the cancerous form of the target.

As we expand our solid tumor CAR-T pipeline, we expect it to become harder to identify targets that are unique to the solid tumor cells. Therefore, we are developing sophisticated systems that can direct a CAR-T cell to kill a tumor cell based on presence or absence of a combination of targets. For example, we believe that we can develop a CAR-T that will kill only tumor cells that have both target A and target B on their surface but will not kill normal cells with target A or target B singularly on their surface.

A related strategy is developing a CAR-T that will kill a cell only if it expresses target A (which may be present on both cancer cells and normal cells) but not target B (which may only be present on normal cells). All such strategies require the co-expression of more than one CAR molecule on the surface of the same CAR-T cell. We believe the piggyBac manufacturing method can enable these approaches due to its large genetic cargo capacity. In contrast, viral-based approaches are typically unable to express more than two CAR molecules.

We have demonstrated that we can produce CAR-T cells that express up to four full-length CAR molecule genes, each with a different target specificity, along with two additional genes, using a single piggyBac transposon in manufacturing (left panel). We further demonstrated that, when expressed, all CAR molecules perform specific killing of corresponding cell lines that express the target (right panel):



Specific killing was evaluated via reporter-based killing assays where the indicated human tumor cells were genetically modified to express the luciferase gene. These tumor cells were co-cultured in vitro with CAR-T cells

for 24 hours at a defined effector to target ratio of ten to one (10:1). The CAR-T cells expressed different combinations of full-length CARs: (1) BCMA CARTyrn, (2) BCMA CARTyrin and PSMA CARTyrin, (3) BCMA CARTyrin, PSMA CARTyrin and CD19 scFv-based CAR or (4) BCMA CARTyrin, PSMA CARTyrin, CD19 scFV-based CAR and GD2 scFv-based CAR. Cytotoxicity (specific lysis) was evaluated by adding luciferin substrate and reading luminescence signal and percent cytotoxicity was calculated by enumerating the luminescence of tumor cells alone versus tumor cells with CAR-T cells. Each individual CAR demonstrated cytotoxicity against its cognate antigen, even when expressed in the presence of three additional full-length CARs.

Another approach to treating solid tumors is to express a variation of a TCR that is specific for a cancer-associated protein that is only expressed inside of the cancer cell, in contrast to a CAR molecule that only recognizes targets on the surface of the cell. We believe we can use the TCR strategy in combination with the CAR strategy by expressing combinations of both CAR and TCR molecules on the surface of the same cell using the piggyBac manufacturing method.

Commercial Scalability

We believe each of the commercial and scalability benefits of our approach in liquid tumors would also apply to solid tumors.

Allogeneic or Universal CAR-T Therapies

Early-Generation Challenges	Poseida's Technologies	The Potential Benefits to Poseida's Approach
Safety and Scalability in Allogeneic CAR-T	• **piggyBac manufacturing** • **T_{SCM} cells** • **Cas-CLOVER gene editing** • **Booster molecules**	• **Proprietary** site-specific gene editing technology – Ability to modify resting T cells to **maintain superior T_{SCM} product composition and function** – **High specificity with no observed off target cutting** minimizing risk of unwanted off-target mutations • Allogeneic approach can be applied across **entire product platform** • Booster molecules result in ability to produce **hundreds or thousands of doses** from a single run, thereby **dramatically reducing cost**

Efficacy Challenge

The goal of an allogeneic, or universal donor, CAR-T product is to create a large number of doses of CAR-T from a single donor or cell line. A successful allogeneic CAR-T product could be used as an off-the-shelf product to treat any patient with a specific indication, thereby greatly decreasing the costs associated with manufacturing. However, if an allogeneic product requires high doses or multiple doses in order to achieve the same efficacy as a similar autologous product, then many of the potential cost-saving advantages of an allogeneic product would not be realized.

Gene editing tools are widely used to eliminate expression of certain cell surface molecules, which may be used to avoid the potential reactivity of donor cells against the patient, which results in GvHD, as well as the reactivity of the patient's cells against the CAR-T product, a reaction called host-versus-graft. We believe it is imperative to use gene editing tools that can efficiently edit resting T cells when creating an allogeneic CAR-T product, as activating T cells will initiate the differentiation pathway. Once T cells begin differentiating, they

start to lose the desirable T_{SCM} cells and the resulting product becomes less efficacious. It is our belief that some gene editing tools, such as TALENs and ZFNs, do not efficiently edit resting T cells. In contrast, our Cas-CLOVER technology is highly efficient at editing resting T cells, which we believe will allow us to maintain the high percentage of T_{SCM} cells and superior functionality of our autologous product candidates even after gene editing to create a fully allogeneic product.

Our goal with all of our allogeneic product candidates is to create a product with efficacy comparable to an autologous version of the same product; in the case of our first fully allogeneic product candidate for multiple myeloma, P-BCMA-ALLO1, our efficacy benchmark will be against P-BCMA-101.

Safety

In addition to the standard concerns regarding CRS and neurotoxicity, there are additional safety concerns relative to an allogeneic product. As mentioned above, an allogeneic product can cause two forms of alloreactivity: GvHD and host-versus-graft. Host-versus-graft is concerning only in that it may cause premature elimination of the allogeneic CAR-T cells, resulting in all of the previously discussed efficacy challenges related to poor persistence of product, but it does not create a safety concern.

However, GvHD, a situation where the CAR-T cells are killing the healthy cells of the patient, is a serious and potentially fatal condition. Studies have suggested that the endogenous TCR is the molecule that needs to be eliminated in order to prevent GvHD. If this molecule is not completely eliminated in nearly 100% of CAR-T cells, then GvHD may become a problem. Our highly efficient Cas-CLOVER technology and subsequent purification step has resulted in cells that have TCR expression completely eliminated from at least 99.9% of the cells, a level thought to be safely above that required to prevent GvHD.

An advantage of an allogeneic product is that many doses can be generated from a single individual donor or cell line. However, a potential disadvantage is that any detrimental mutation created during manufacturing would be potentially present in doses given to many patients, as opposed to an autologous product where this risk is limited to the individual patient. Therefore, it is especially important to minimize or completely prevent unwanted off-target mutations, which could potentially lead to a transformation event and cancer. It is well known that some gene editing technologies, such as CRISPR, have the possibility of creating unwanted mutations. In preclinical testing, our Cas-CLOVER technology has shown precise site-specificity, having no or very little propensity for creating off-target mutations. Based on preclinical data generated at Poseida and previously published results on other fully dimeric CRISPR systems, we believe Cas-CLOVER is the most specific editing method available.

Commercial Scalability

A fully allogeneic CAR-T product would offer the possibility of significant time and cost savings in manufacturing, thereby greatly decreasing the cost per dose and increasing patient accessibility. Nonetheless, a manufacturing process must still be run on individual donor or cell line material in order to create a fixed number of doses of an allogeneic product. One of the most expensive parts of a manufacturing run for viral-based manufacturing methods is the virus itself. The piggyBac manufacturing system uses only GMP DNA and RNA without the need for GMP virus. We believe this will result in product candidates that are significantly cheaper to produce, even in the context of an allogeneic CAR-T product. Furthermore, the development and manufacturing timelines for piggyBac are shorter than those for virus, meaning one can move from product concept to GMP material more quickly. As an example, we moved P-BCMA-101 from product concept to the first patient dosed in a clinical trial in less than two years, and we believe we can apply these learnings to meet or exceed these timelines for future product candidates.

Genetic modification of the TCR, necessary to avoid GvHD as discussed previously, creates T cells that may be difficult to expand during the manufacturing process. We have developed proprietary booster molecules

that have the potential to overcome this issue, while retaining or even increasing the percent of T_{SCM} cells in the final product. Therefore, we believe that we can create fully allogeneic product candidates, such as P-BCMA-ALLO1, that retain comparable efficacy and safety of the corresponding autologous product, but with the ability to create enough doses to potentially treat hundreds or thousands of patients from a single manufacturing run.

Our CAR-T Product Candidate Pipeline

We believe we are particularly well-positioned to drive the continued advancement of CAR-T therapies in oncology and are focused initially on indications with high unmet need. Our proprietary non-viral, gene engineering technologies are designed to address some of the greatest challenges to the successful implementation and commercialization CAR-T therapies. We have built a wholly-owned pipeline of autologous and allogeneic CAR-T product candidates, initially focused on the treatment of hematological malignancies and solid tumors.

P-BCMA-101: Autologous CAR-T for Multiple Myeloma

Overview

P-BCMA-101, our lead product candidate, is an autologous CAR-T therapy being developed to treat patients with relapsed/refractory multiple myeloma. P-BCMA-101 targets BCMA, which is expressed on essentially all multiple myeloma cells. P-BCMA-101 utilizes several of our proprietary CAR technologies, including an anti-BCMA CAR molecule gene, a human DHFR gene, which is used to manufacture a highly purified product, as well an iCasp9-based safety switch gene, which we believe allows elimination of some or all of the P-BCMA-101 cells following treatment if desired by the clinician. All components of the P-BCMA-101 transgene are comprised of fully human sequences. We are currently conducting a Phase 1 dose-escalation clinical trial for P-BCMA-101.

The P-BCMA-101 CAR molecule utilizes an anti-BCMA Centyrin as the binding molecule, rather than an scFv antibody fragment used in most other CAR-T therapies. Centyrins, like antibody fragments, have high binding affinities and are target-specific. However, Centyrins are fully human, making them potentially less immunogenic than scFv derived from mouse. Centyrins are also stable on the cell surface and do not form multimers, which we believe render them resistant to tonic signaling and T cell exhaustion.

P-BCMA-101 is engineered using our piggyBac DNA Modification System. PiggyBac modification of human T cells requires only piggyBac transposon transgene DNA and RNA encoding piggyBac transposase, the enzyme that specifically mobilizes piggyBac transposon DNA, thereby eliminating the need for viral vectors and resulting in significant time and cost savings in manufacturing. P-BCMA-101 is produced with our proprietary manufacturing system that results in a highly purified product with a cell composition comprised of a high percentage of T_{SCM} cells, which we believe convey numerous benefits over other CAR-T products manufactured using viral methods.

Target Indication

Multiple myeloma is a deadly form of blood cancer that develops from plasma cells, a type of immune cell that is typically responsible for secreting antibodies to fight infection. The underlying cause of multiple myeloma is unknown, but it affects patients by creating abnormal plasma cells and antibodies resulting in kidney and other organ malfunction. It can also cause overproduction of abnormal plasma cells in the blood and tumor masses called plasmacytomas in the bone marrow or soft tissue.

There are approximately 100,000 patients suffering from multiple myeloma in the United States, with 30,000 new cases and nearly 13,000 deaths from the disease annually. It occurs more commonly in men than in women, typically striking older adults, with the average age of onset of approximately 61 years.

The current treatment paradigm in multiple myeloma begins with proteasome inhibitors and immunomodulatory imide drugs, or IMiDs. The great majority of patients become refractory to these drugs and/or relapse, creating a high unmet need for treatments for relapsed/refractory patients. After failing proteasome inhibitors and IMiDs, patients typically resort to intensive chemotherapy regimens, with or without autologous stem cell transplant, or move to palliative care.

Multiple myeloma is rarely cured, with the great majority of patients dying from the disease. Without treatment, the typical life span of a multiple myeloma patient is approximately seven months, while approximately half of those treated under the current regimens survive for five years after diagnosis. We believe P-BCMA-101, if successful in the clinic, can dramatically increase survival, as well as quality of life for relapsed/refractory multiple myeloma patients.

Clinical Data

The primary objectives of the ongoing Phase 1 clinical trial are to evaluate safety and any dose limiting toxicities, or DLT, and determine the maximum tolerated dose, or MTD, of a single-dose infusion of P-BCMA-101 in adult patients with multiple myeloma who are relapsed and or refractory to conventional therapy. In addition, we are assessing anti-myeloma response activity using the International Myeloma Working Group, or IMWG, criteria.

We are initially focused on enrolling patients with relapsed/refractory multiple myeloma who have received at least three prior lines of therapy, including a proteasome inhibitor and an IMiD, and/or who are double refractory to a proteasome inhibitor and an IMiD.

The protocol allows for enrollment of up to 40 adult subjects across up to five cohorts, using a standard 3 + 3 dose-escalation design. Eligible subjects who enroll in the study undergo leukapheresis, a procedure that specifically collects a patient's peripheral blood mononuclear cells, or PBMCs, a population of cells that contains the patient's white blood cells, including T cells, for P-BCMA-101 manufacturing. Before administering the P-BCMA-101 product candidate, subjects receive a standard conditioning lymphodepletion chemotherapy regimen of 300 mg/m2 of cyclophosphamide and 30 mg/m2 of fludarabine, with each chemotherapy agent given intravenously daily for three consecutive days. We believe that the conditioning regimen is important to create space in the bone marrow for the engraftment of the T cells after administration of the P-BCMA-101 product candidate.

Consenting subjects who have received P-BCMA-101 and have completed or withdrawn from the Phase 1 clinical trial can enroll in a separate trial that allows for continued follow up for a total of 15 years after dosing to evaluate long-term safety. As of November 29, 2018, one patient has consented for the additional trial that allows for continued follow up for a total of 15 years after dosing to evaluate long-term safety.

Phase 1 Clinical Trial: Interim Findings

Interim data from our ongoing P-BCMA-101 Phase 1 clinical trial for patients with relapsed/refractory multiple myeloma was presented at the American Society of Hematology, or ASH, annual meeting on December 3, 2018.

This open-label, multicenter, single-ascending dose, Phase 1 clinical trial is designed to assess the safety of P-BCMA-101 in up to 40 patients with relapsed and/or refractory multiple myeloma. The primary objective of this trial is to determine the safety and maximum-tolerated dose of P-BCMA-101. Secondary objectives include evaluation of the anti-myeloma effect of P-BCMA-101. As of the cutoff date of November 21, 2018, 21 patients had been treated across four dose cohorts with no dose limiting toxicities observed. As of November 29, 2018, two additional patients in Cohort 5 are being dosed with our highest dose level of more than one billion (1000×10^6) CAR-T cells each but had not yet been evaluated as of the data cutoff date.

Patients were treated in escalating dose cohorts based on weight as set forth in the following table, with the average total number of administered CAR-T cells partitioned into the dose groups indicated below:

Cohorts Assessed	cells/kg	
1	0.75 x 10^6	
2	2 x 10^6	
3	6 x 10^6	
4	10 x 10^6	
5	15 x 10^6	
Total CAR-T cell administered per dose group	cells (mean)	patients (#)
range 48 –1241 x 10^6	**51 x 10^6**	**3**
	152 x 10^6	**7**
	456 x 10^6	**7**
	845 x 10^6	**4**
	1143 x 10^6	**2**

The median enrolled patient age was 61, with 14 patients considered high-risk, including those with high-risk cytogenetics. The majority of patients received six or more prior lines of therapy and all patients had received at least one proteasome inhibitor and at least one IMiD. Ninety-one percent of these patients had received daratumumab and eighty-three percent of the patients had received an autologous stem cell transplant.

Enrolled patient demographic and characteristic data are presented in the figure below:

Patients (n=23)		
Median (min, max) age, years	61 (42, 74)	
Male, n (%)	16 (70)	
Median (min, max) time since diagnosis, years	4.6 (2.4, 13.2)	
High-risk, n (%)	14 (61)	
ECOG PS, n (%)		
0	8 (35)	
1	14 (61)	
Median (min, max) prior regimens	6 (3, 11)	
	Exposed	Refractory
proteasome inhibitor, n (%)	23 (100)	14 (61)
Bortezomib	23 (100)	14 (61)
Carfilzomib	20 (87)	13 (57)
IMiD, n (%)	23 (100)	19 (83)
Lenalidomide	23 (100)	18 (78)
Pomalidomide	21 (91)	19 (83)
daratumumab, n (%)	21 (91)	18 (78)
Prior autologous SCT, n (%)	19 (83)	

Interim Safety Results

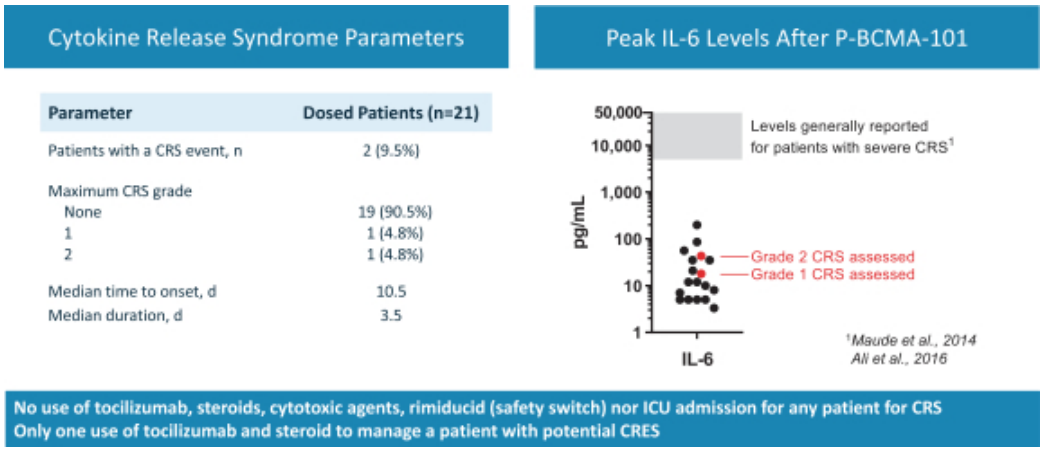
All 21 patients treated as of the November 21, 2018 data cutoff date and evaluable for safety results received a single dose of P-BCMA-101 following a standard conditioning regimen of lymphodepleting chemotherapy consisting of 300 mg/m2 cyclophosphamide and 30 mg/m2 fludarabine. The table below summarizes treatment-emergent adverse events, or TEAEs, considered particularly relevant to CAR-T cell products and lymphodepletion regimens. Grade 1 toxicities are generally considered mild, Grade 2 toxicities are medium, Grade 3 toxicities are serious, Grade 4 toxicities are potentially life threatening and Grade 5 result in death. No patient deaths have been reported as related to treatment with P-BCMA-101.

TEAEs of Interest, n (%)	**Overall**	[3] **Grade 3**
Dose Limiting Toxicity (DLT)(1)	0	0
Cytokine Release Syndrome(1)	2 (9.5%)	0
Neurotoxicity(1)		
Grade 2 CRES with Grade 3 confusion (1 pt)	1 (4.8%)	1 (4.8%)
Neutropenia/Neutrophil count decreased(2)	14 (66.7%)	14 (66.7%)
Thrombocytopenia/Platelet count decreased(2)	10 (47.6%)	7 (33.3%)
Anemia	8 (38.1%)	7 (33.3%)
Infection(3)		
Overall	8 (38.1%)	2 (9.5%)
First month	6 (28.6%)	2 (9.5%)

(1) by investigator assessment; confusion reported in patient with baseline mental status decrement not including orthostatic dizziness or peripheral neuropathy/tremor. The term CRES refers to CAR-T Related Encephalopathy Syndrome.
(2) includes events in the SOC Infections and Infestations. Subject counted once for any PT within the SOC.
(3) subject counted once for either term.

The most common TEAEs reported were neutropenia, febrile neutropenia and anemia, which are consistent with conditioning lymphodepletion therapy and the underlying disease and not generally believed to be related to CAR-T therapies like P-BCMA-101.

Notably, very little CRS has been reported with P-BCMA-101. As seen in the chart below, as of the November 21, 2018 data cutoff date, two cases of CRS (9.5%) had been observed, one Grade 1 and one Grade 2. In both cases, the CRS was minimal and transient and neither patient was treated with an IL-6 inhibitor or steroids, which are standard therapies for CRS. In addition, no patient required admittance to the intensive care unit for CRS or neurotoxicity. In both patients, peak measured IL-6 levels, a suspected correlate marker for CRS, were under 50 pg/ml, far below the levels typically associated with severe CRS.

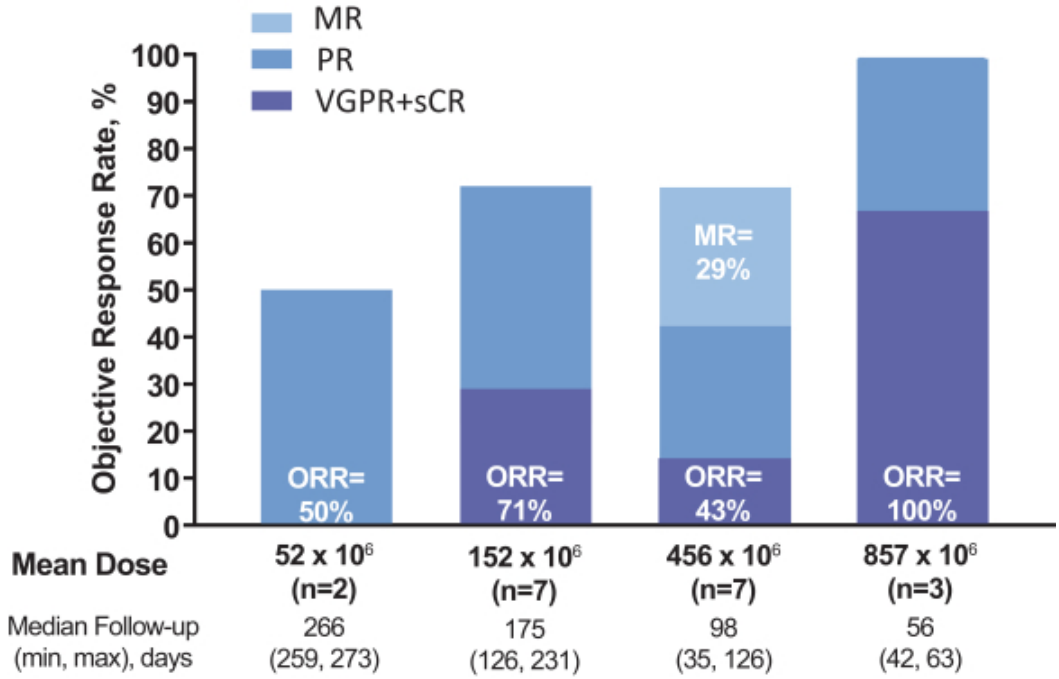


One case of suspected neurotoxicity (4.8%) was observed in a patient with mental status changes prior to treatment and was treated with an IL-6 inhibitor and steroids. No dose limiting toxicities have been reported as of the data cutoff date, nor has use of the safety switch been indicated in any patient.

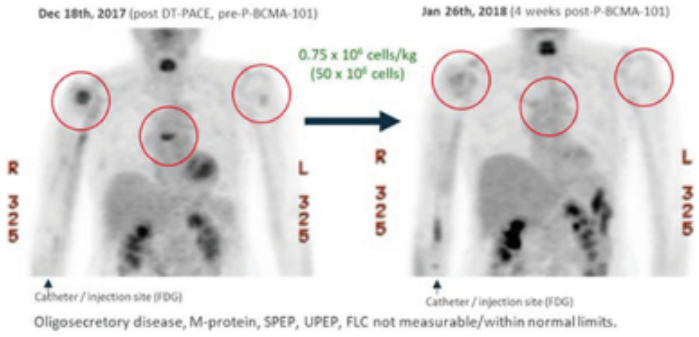
Interim Response Results

As of November 21, 2018, 19 patients treated with P-BCMA -101 were evaluable for response by International Myeloma Working Group, or IMWG, criteria. One patient from Cohort 1 was not evaluable by IMWG criteria due to the lack of protein markers. One patient treated in Cohort 4 and two patients treated in Cohort 5 were not evaluable for response as of the data cutoff date because they had not yet reached the time-point for their first assessment.

Of these 19 evaluable patients, 14 showed meaningful responses, including five patients who demonstrated stringent complete response, or sCR, complete response, or CR, or very good partial response, or VGPR, seven patients who demonstrated partial response, or PR, and two patients treated within 60 days of the data cutoff date who demonstrated minor response, or MR, and continued to show improvement. The following chart presents the objective response rate, or ORR, by dose for IMWG evaluable patients by dose group, with a breakdown by depth of response:



Of note, while three patients were treated in Cohort 1, one patient was only evaluable by positron emission tomography, or PET, scan and was not evaluable by m-protein-based IMWG criteria at the time of treatment. While not included in the statistics above, the patient had a notable response by PET. Pictured below are the patient scans at baseline and again at four weeks post P-BCMA-101 treatment with plasmacytomas (tumors) indicated with circles, visibly illustrating the activity of the product candidate:



In the original design of the Phase 1 clinical trial, we had provided for testing for minimal residual disease, or MRD, only after patients reached a CR. Since the clinical trial was originally designed, MRD has become

better understood to correlate with CRs and the risk for relapse. As a result, we modified the protocol to test patient MRD status earlier in the process and that testing is underway. As of November 29, 2018, two patients have tested negative for MRD.

Many patients have only recently been treated in this ongoing trial, therefore, we could not objectively assess duration as of the data cutoff date. While we believe that the high percentage of T_{SCM} phenotype cells in our P-BCMA-101 product candidate will enhance the probability of achieving durable responses, it will take more time to assess the durability of responses observed as of the data cutoff date. However, the data available as of the cutoff date is encouraging, with two of three patients from Cohort 1 still alive at approximately 10- and 11-months post P-BCMA-101 treatment.

Future Clinical Development Strategy

Given the clinical results seen to date, we plan to rapidly move into a Phase 2 clinical trial to support potential accelerated or full approval of a BLA based on response rates and duration of response, the same endpoints used for a number of approved multiple myeloma therapies such as daratumumab, bortezomib and carfilzomib. Subsequently, we plan to conduct additional Phase 2 and comparative Phase 3 clinical trials to support full approval, if required, and label expansion to expand the indication into earlier lines of therapy and combination therapies.

P-PSMA-101: Autologous CAR-T for Prostate Cancer

Overview

P-PSMA-101 is a solid tumor autologous CAR-T product candidate being developed to treat CRPC. P-PSMA-101 targets cells that express PSMA, which is expressed on most prostate cancer cells. PSMA is involved in folate uptake and is thought to confer a proliferative advantage to PSMA-expressing tumor cells. Additionally, PSMA levels increase as tumor cells become androgen-independent, a hallmark of advancing prostate disease. Therefore, we believe that PSMA may be less susceptible to antigen escape. P-PSMA-101 is currently undergoing IND-enabling activities and we anticipate an IND filing and initiation of a Phase 1 clinical trial in the second half of 2019.

The piggyBac transposon transgene of the P-PSMA-101 product candidate differs from P-BCMA-101 only in the binding (Centyrin) portion of the CAR molecule used, thereby helping to reduce development and manufacturing risk by leveraging the experience gained with P-BCMA-101. As with P-BCMA-101, P-PSMA-101 includes a DHFR gene used to manufacture a highly purified product, as well as an iCasp9-based safety switch gene that we believe will allow some or most cells to be eliminated in the patient, if desired. Also, as with P-BCMA-101, P-PSMA-101 is produced with our proprietary manufacturing system that results in a highly purified product with a cell composition comprised of a high percentage of T_{SCM} cells, with the goal of conveying numerous benefits over other CAR-T products manufactured using viral methods.

Target Indication

Prostate cancer is the third most common cancer globally and the second leading cause of cancer death among men in the United States, with a 60% occurrence rate in men over the age of 65. In the United States alone, there are approximately 2.8 million men living with prostate cancer, with approximately 40,000 new cases of metastatic CRPC estimated each year. The majority of prostate cancer patient deaths in the United States are due to metastatic CRPC.

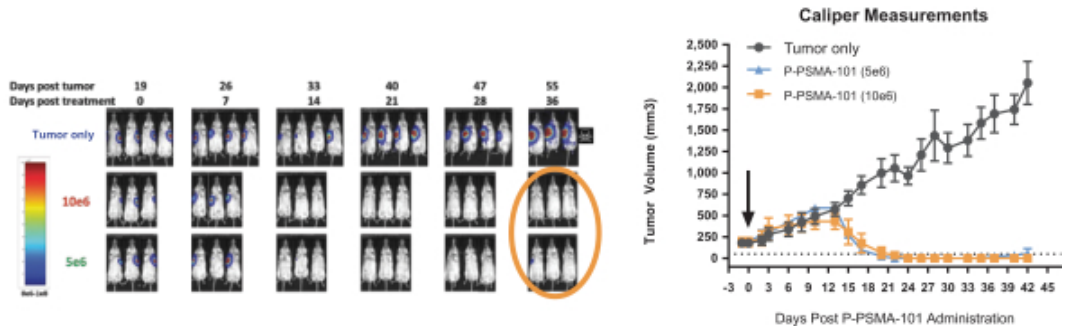
Treatment paradigms for prostate cancer vary based on the age of the patient at the time of diagnosis. Typical treatment options for prostate cancer range from active surveillance, radiation therapy, cryotherapy, immunotherapy, hormone therapy and surgical treatment. For metastatic disease, the paradigm bifurcates

between hormone naïve disease and CRPC. CRPC cases are typically treated with the chemotherapy drug docetaxel, and a choice of abiraterone, enzalutamide, cabaziltaxel and/or Radium-223. Typically, none of these therapies are curative.

Although five-year survival rates for local and regional prostate cancers are nearly 100%, a high unmet need for CRPC remains, with a five-year survival rate of only approximately 25%. We believe P-PSMA-101, if successful in the clinic, can dramatically increase survival, as well as quality of life for CRPC patients.

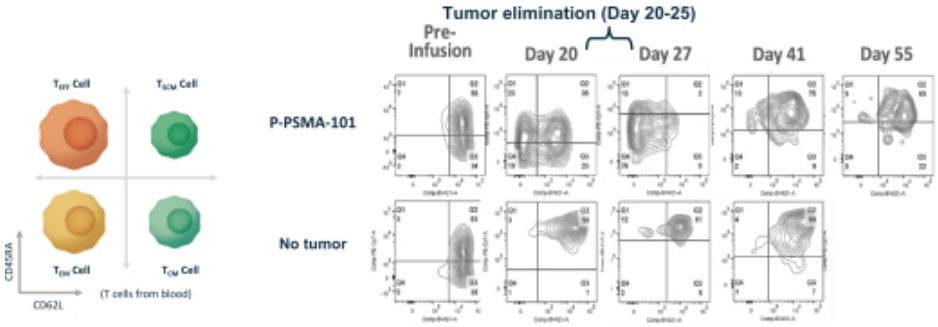
Preclinical Data

P-PSMA-101 resulted in the elimination of tumor cells to undetectable levels in 100% of animals in a preclinical model of prostate cancer. This preclinical model involves the implantation of subcutaneous solid tumors comprised of a human metastatic CRPC cell line (LNCaP (fLuc+)) in immuno-deficient mice. These tumors were well established to a size of at least 100 mm^3 before administration of P-PSMA-101. In the model shown below, we demonstrated elimination of tumors to below the limit of detection by both bioluminescence imaging measurements (left panel in figure) or caliper measurements (right side of figure) in 100% of animals with both a standard dose of 10 million P-PSMA-101 cells per animal (10 x 10^6), as well as a low dose of five million cells per animal (5 x 10^6). One animal in the low dose cohort relapsed later in the study. To our knowledge based on published literature, no other product candidate has shown complete solid tumor elimination in any animal in this preclinical model:



P-PSMA-101, comprised of a high percentage of T_{SCM} cells, expanded in vivo and gave rise to CAR-positive T cells that were more differentiated, including T_{EFF} cells, which were detected in the peripheral blood at early timepoints, followed by a decrease in tumor burden to below detectable levels as measured by both bioluminescent imaging and caliper.

Consistent with our hypothesis, the short-lived, more differentiated T cells were then eliminated and the long-lived T_{SCM} cells engrafted and persisted, and were the only cells detectible in the peripheral blood at later timepoints. Thus, even after solid tumor elimination, a population of P-PSMA-101 T_{SCM} cells persisted. The figures below show that in mice with no tumor, T_{SCM} cells engrafted and persisted without in vivo expansion and differentiation. In contrast, T_{SCM} cells expanded and differentiated in the presence of tumor in subject mice treated with P-PSMA-101, and continued to persist following solid tumor elimination:



Clinical Development Strategy

We are completing IND-enabling activities for P-PSMA-101 and anticipate an IND filing and initiation of a Phase 1 clinical trial in the second half of 2019. P-PSMA-101 will be administered as a single dose after a standard 3-day lymphodepleting regimen. Patients will be followed for safety and anti-tumor activity for up to 15 years thereafter. We will evaluate further development based on the outcome of this trial.

P-BCMA-ALLO1: Allogeneic CAR-T in Multiple Myeloma

Overview

P-BCMA-ALLO1 is a fully allogeneic CAR-T product candidate being developed to treat multiple myeloma, which we believe could be used either as a stand-alone therapy or a bridging therapy to the use of P-BCMA-101. P-BCMA-ALLO1 is in late preclinical development. We anticipate an IND filing and initiation of a Phase 1 clinical trial for P-BCMA-ALLO1 by late 2019 or early 2020.

P-BCMA-ALLO1 is our first allogeneic universal donor CAR-T product candidate derived from healthy donor cells, giving it the potential to be used as an off-the-shelf therapy for unrelated multiple myeloma patients. We believe our technology and manufacturing process are ideally suited to develop allogeneic CAR-T product candidates with reduced alloreactivity and without unwanted mutations. We use our proprietary Cas-CLOVER platform to genetically engineer T cells in order to reduce or eliminate both GvHD and host versus graft alloreactivity. Cas-CLOVER is designed to efficiently edit resting T cells and has demonstrated precise specificity, thereby limiting unwanted off-target mutations and helping to ensure patient safety.

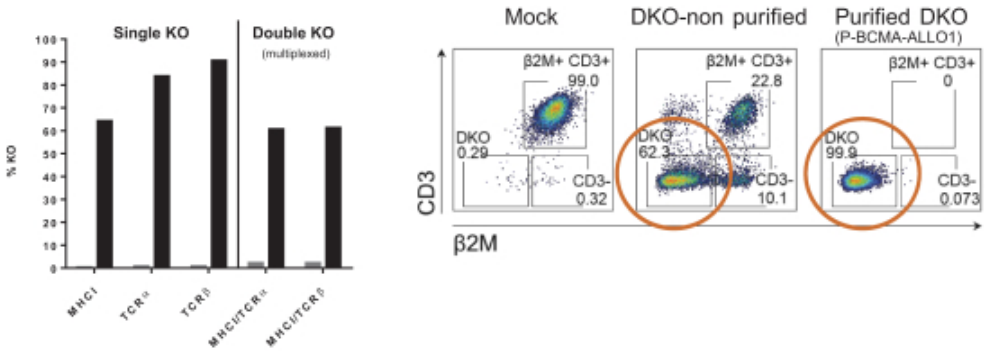
The manufacturing process for P-BCMA-ALLO1 shares characteristics with P-BCMA-101, differentiated only by the process of gene editing and a purification step. Both include a DHFR gene used to manufacture a highly purified product, as well the iCasp9-based safety switch gene that allows some or most cells to be eliminated from the patient, if desired.

We believe an allogeneic product with similar safety and efficacy to an autologous product would have significant advantages in terms of cost and commercial reach, with the ability to treat hundreds or thousands of patients from a single manufacturing run.

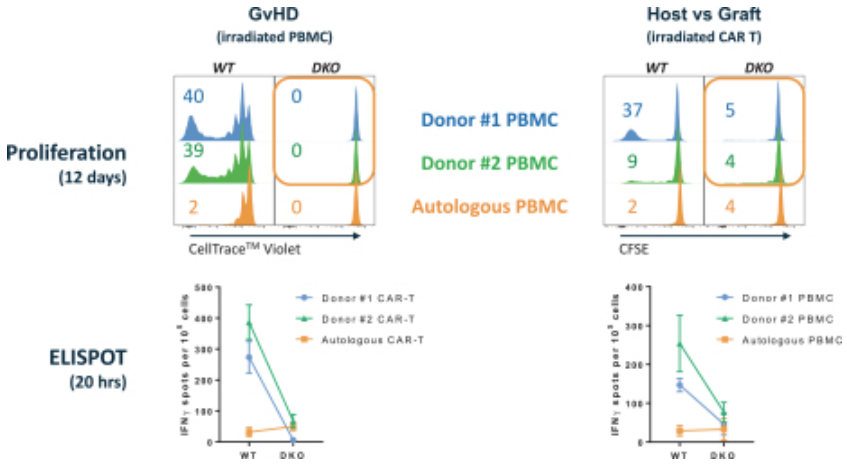
Preclinical Data

We used our proprietary Cas-CLOVER gene editing platform, which has the ability to multiplex and efficiently edit resting T cells, to eliminate expression of cell surface proteins that are responsible for alloreactivity in a single gene editing step, followed by a purification step.

The figure below demonstrates highly efficient multiplexed gene editing to simultaneously disrupt the TCRa or TCRb gene and the Beta-2 microglobulin gene (MHCI). Complete elimination of all TCR expression occurred in over 90% of cells with a single gene editing step and complete elimination of both TCR and MHCI occurred in over 60% of cells after a single multiplexed gene editing step. Cells that had both TCR and MHCI expression eliminated are referred to as double KO, or DKO cells (left panel). After a single purification step, we were able to achieve a product candidate with more than 99.9% of cells with a DKO (right panel). The purified DKO cells comprise our P-BCMA-ALLO1 product candidate:



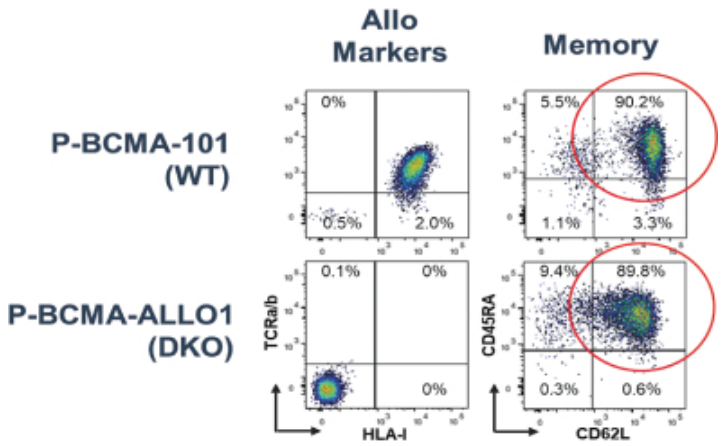
Multiple preclinical experiments demonstrate the ability of P-BCMA-ALLO1 (DKO) to reduce or eliminate alloreactivity. In the figure below, the experiments testing for graft versus host alloreactivity are on the left and experiments testing for host versus graft alloreactivity are on the right. The top panels are a mixed lymphocyte reaction, or MLR, where alloreactivity was demonstrated by a peak forming on the left-hand side of the graph. Peaks were clearly seen when non-genetically modified cells (WT) were mixed with cells from an unrelated donor, but not when mixed with cells from the same donor. Alloreactivity was eliminated when testing the P-BCMA-ALLO1 cells (DKO). The lower panels are a separate assay for alloreactivity called an ELISPOT, which measures reactivity by release of IFNg. As with the MLR assay, alloreactivity was seen when WT cells were mixed with donor cells, but not when mixed with cells from the same donor. Alloreactivity was eliminated when testing the P-BCMA-ALLO1 cells (DKO):



The cells used in MLR and ELISPOT assays were P-BCMA-101 (WT) or P-BMCA-ALLO1 (DKO) CAR-T products generated using T cells from the same donor (hereafter referred to as Donor #3), PBMC from Donor #3 (i.e. Autologous PBMC), and PBMC from Donor #1 and Donor #2. Donors #1 and #2 were selected from an in-house bank of PBMC because pilot experiments indicated that they were highly reactive to, and stimulatory for, Donor #3 T cells. These cells were labeled with one of two cytosolic dyes: CellTrace™ Violet for the WT or DKO cells and carboxyfluorescein succinimidyl ester, or CFSE, for the PBMCs. A portion of each labeled cell type was irradiated (3,000 rads) to arrest proliferation and possibly increase immunogenicity. GvHD reactions were modeled by co-culturing non-irradiated WT or DKO cells with irradiated PBMC. Likewise, host vs graft reactions were modeled by co-culturing irradiated WT or DKO cells mixed with non-irradiated PBMC. In the 12-day proliferation MLR assay, the response of the non-irradiated cell type was assessed by flow cytometry and visualized as histograms in which the undivided cells retain high levels of cytosolic dye and thus appear on the right-hand side of the histogram and those cells that have undergone a proliferative response will dilute the cytosolic dye with each division, thereby appearing in peaks shifted to the left. Cells that have divided more than six times are beyond the sensitivity of this experiment and accumulate in one peak on the far left of the histogram. The frequency (average, n=4) of the cells with fully diluted cytosolic dye appears above the histogram in each panel. In the ELISPOT, after 20 hours of co-culture on a specialized membrane (MABTECH, Inc.), the cells were washed from the plates and the IFNy “spots” were developed according to the manufacturer’s instructions and enumerated. As shown, these experiments were conducted one time with four technical replicates each for the proliferation assay (range and median frequency of dye-dilute cells in a table below) and for the ELISPOT (average and SD shown in figure). Comparable results were obtained from similar experiments conducted with PBMC from these donors and WT or DKO products from three additional donors.

Median (range)	WT GvH	DKO GvH	WT HvG	DKO HvG
Donor 1 PBMC	40% (37-44%)	0.1% (0.0-0.1%)	38% (31-41%)	4.9% (3.7-6.0%)
Donor 2 PBMC	39% (37-42%)	0.0% (0.0-0.2%)	7.0% (6.7-14%)	3.3% (2.4-5.4%)
Donor 3 PBMC	2.2% (1.3-3.1%)	0.0% (0.0-0.1%)	2.4% (2.1-2.5%)	4.1% (3.7-4.9%)

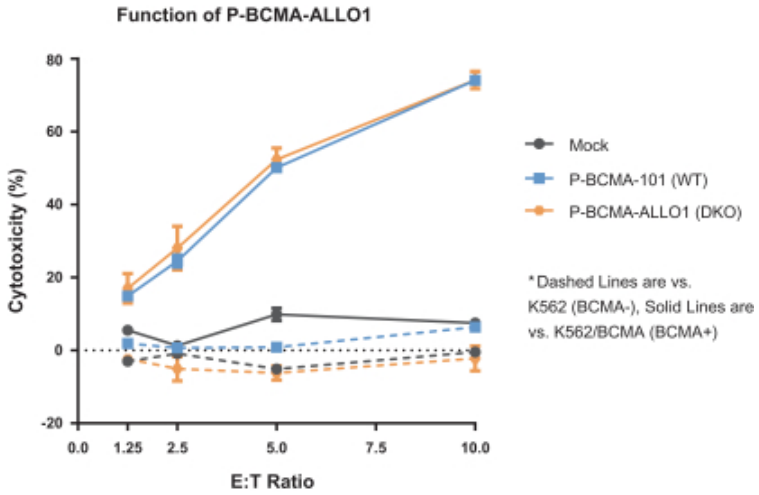
One of our goals for P-BCMA-ALLO1 is to preserve the same high percentage of T_{SCM} cells in the final product that we have observed with our P-BCMA-101 and solid tumor autologous product candidates. The figure below demonstrates that P-BCMA-ALLO1 had a similar percentage of T_{SCM} cells (shown in red circle) as P-BCMA-101:



P-BCMA-101 (WT) and P-BCMA-ALLO1 (DKO) cells were produced using primary T cells from healthy donors and then analyzed by flow cytometry as indicated in the figure. During the production of DKO cells, the T cell receptor a chain (TCRa) and b-2 microglobulin (b2M) genes are disrupted using the Cas-CLOVER gene editing system and the cells with persistent surface expression of the targeted molecules are removed by

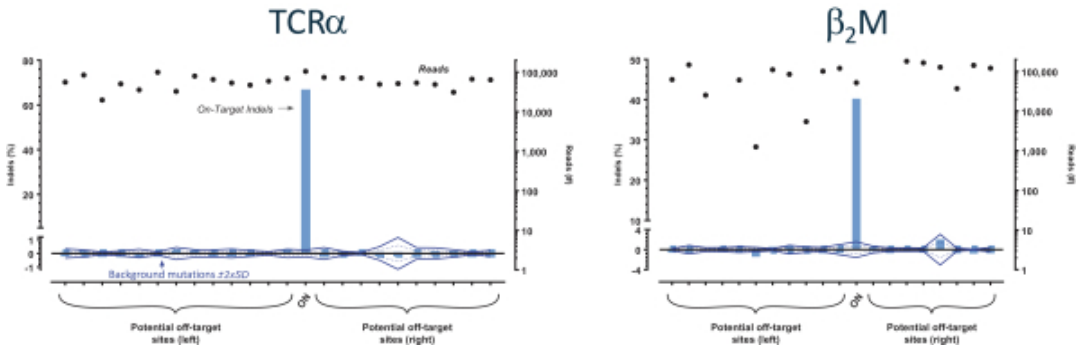
immuno-magnetic separation (i.e. Miltenyi MACS beads and antibodies binding CD3, TCRa, and b2M). This process renders the DKO cells incapable of expressing the TCR, which mediates GvHD, or class I major histocompatibility complex, or MHCI, molecules, which would enable rejection of the product by the allogeneic recipient's immune system. The left panels above demonstrate that while the WT cells stain positively for the TCR and MHCI (as detected by monoclonal reagents TCRa/b heterodimers and the HLA-I MHC molecule, respectively), these molecules were undetectable on DKO cells. In the right panels, analysis of CD8+ T cells in the two products demonstrates similar frequencies of T_{SCM} cells (indicated by red circles), a subset that is defined by co-expression of the CD62L and CD45RA markers.

Further, we have demonstrated that P-BCMA-ALLO1 had comparable intensity and specificity of killing target cells as P-BCMA-101:



Cytotoxicity was measured in a standard in vitro killing assay. Briefly, primary healthy donor human T cells were taken through one of three production processes: (i) "Mock" cells were submitted to all steps of the P-BCMA-101 process except genetic modification with the P-BCMA-101 transposon, (ii) "WT" cells were generated using the P-BCMA-101 production process and (iii) "DKO" cells were generated using the P-BCMA-ALLO1 manufacturing process. The three T cell products were mixed at effector to target ratios shown with target cells that were either BCMA-positive or control, BCMA-negative K562 cells. In this assay, both target cell lines also express the luciferase protein and the amount of live and intact target cells in culture can be indirectly assessed as a function of the luciferase enzyme that they contain. After 48 hours of co-incubation, cytotoxic activity by the T cell products is evident as a decrease in the amount of live and intact target cells and expressed as data normalized to the same value for target cells cultured alone (i.e., 0% cytotoxicity is seen without T cells). The data above demonstrate that while all three T cell products exhibit little cytotoxicity against BCMA-negative cell lines, the WT and DKO demonstrate killing specifically of the BCMA-positive cell lines. Moreover, the specific killing increased with higher effector to target ratios and the fact that both WT and DKO products demonstrated virtually identical trends at each effector to target ratio indicates that both products have similar intensity and specificity of killing.

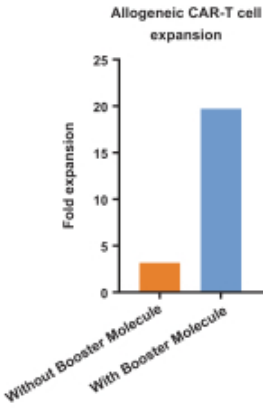
Importantly, we demonstrated that Cas-CLOVER exhibited a high degree of specificity for on-target cutting during the cutting of gene targets in the production of P-BCMA-ALLO1. We performed deep sequencing of numerous top-ranked predicted off-target sites corresponding to these gene targets, and we have not observed any evidence of off-target activity:



Cas-CLOVER can be used to efficiently knock-out several human T cell surface marker genes, such as T cell receptor a chain (TCRa) and b-2 microglobulin (b2M). To determine the level of off-target activity by Cas-CLOVER, next generation sequencing was used to investigate T cells gene-edited for TCRa or b2M genes. To do so, an algorithm was designed to predict all potential off-target sites of high DNA homology throughout the whole human genome for Cas-CLOVER guide mRNA (gRNA). As Cas-CLOVER functions as an obligate homodimer, there are several hypothetical possibilities of dimer formation including left (L) gRNA + right (R) gRNA heterodimer, L + L and R + R homodimers, as well as L only and R only. On-target site and the top predicted off-target site amplicons from the above five different hypothetical combinations were PCR-amplified and the amplicons were analyzed using the Illumina Mi-Seq platform for deep sequencing with 30,000 to 100,000 coverage at each locus for the identification of insertions and/or deletion (indels).

In the above figure, the right Y axis shows the deep sequencing coverage rate at each locus, whereas the left Y axis shows the percentage of indels. The dotted lines show the level of background mutation in the absence of gene editing while the solid line shows 2x of the error bar of the control. The bars show the percentage of indels of all on and off target sites. These data show that the indels resulting at predicted potential off-target sites of high DNA homology are within the range of the background mutation rate of the non-edited negative control. Thus, next generation sequencing data confirmed that only combination of the paired gRNAs gave gene editing at target sites. Next generation sequencing data further showed that there is no off-target editing among the top predicted off-target sites.

Lastly, using a proprietary technology that we call booster molecules, we believe we can expand P-BCMA-ALLO1 cells to large numbers without losing any of the cell attributes shown previously. In a preclinical study, we measured cell expansion of allogenic CAR-T cells with and without the use of a booster molecule, and observed an approximately five times greater expansion during a single manufacturing run with a booster molecule, when compared to a manufacturing run without using a booster molecule. We estimate that we can generate enough cells from a single manufacturing run to treat hundreds or thousands of patients:



Clinical Development Strategy

We anticipate an IND filing and initiation of a Phase 1 clinical trial for P-BCMA-ALLO1 by late 2019 or early 2020.

P-MUC1C-101: Autologous CAR-T in Multiple Solid Tumor Indications

Overview

P-MUC1C-101 is a late-stage preclinical autologous CAR-T product candidate with the potential to provide therapeutic benefit in multiple solid tumor indications.

We used our proprietary piggyBac DNA Modification System to manufacture a highly purified P-MUC1C-101 product candidate containing a high percentage of T_{SCM} cells that we believe may be the key to developing a CAR-T therapy to treat solid tumors.

P-MUC1C-101 is currently undergoing late-stage preclinical development and we anticipate an IND filing and initiation of a Phase 1 clinical trial in 2020.

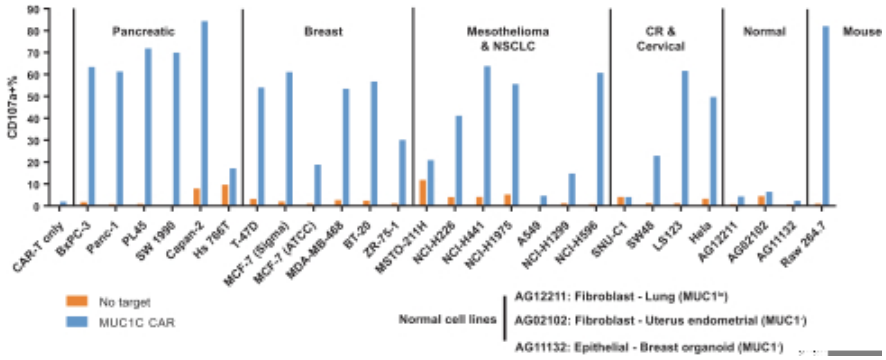
Target Indication

We intend to further evaluate and later determine initial clinical indications for initial development of P-MUC1C-101 in indications where MUC1 expression occurs. Approximately 90% of cancers derive from epithelial tissues, and among these cancers, a significant percentage express MUC1. This includes common cancers such as breast, colorectal, lung, ovarian, pancreatic, renal and other cancers.

Tumor Type	MUC1 Expression (%)
Breast	91
Colorectal	81
Esophageal	32
Gastric	77
H&N SCCa	82
Mesothelioma	75
Multiple myeloma	59
Nasopharyngeal	100
NSCLC	99
Ovarian	83
Prostate	79
Pancreatic	81
RCCa	84

Preclinical Data

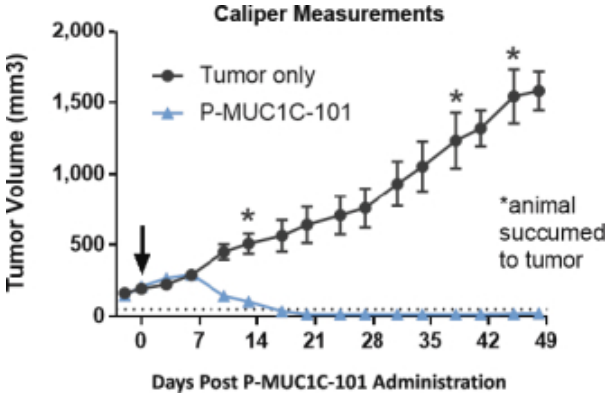
In our preclinical studies, P-MUC1C-101 showed robust anti-tumor activity against multiple tumor lines:



The P-MUC1C-101 CAR was evaluated for specificity and function using a standard T cell degranulation assay. Degranulation is a surrogate of T cell killing that can be easily measured by FACS staining for intracellular CD107a expression following coculture with cells expressing target antigen. mRNA encoding the P-MUC1C-101 CAR was delivered to pan T cells via electroporation and the cells were rested overnight to allow

for translation and surface expression of the CAR. T cells expressing P-MUC1C-101 CAR were co-cultured for four to six hours with the indicated tumor cells. Six different cancer types were evaluated in these studies, including both solid and blood tumors. During the co-culture period, CD107a antibody was added to detect degranulation of T cells. The percentage of CD107a T cells is shown in the graph above and indicates tumor-specific activity. Degranulation frequency correlated highly with MUC1-C expression on the target tumor cells.

We also tested P-MUC1C-101 in a preclinical xenograft model of breast cancer in which immuno-deficient mice were implanted with a human MCF-7 metastatic breast cancer cell line. In this model, P-MUC1C-101 eliminated tumor cells to undetectable levels, as shown below:



While preclinical development is still ongoing, early signs suggest that our MUC1C binder is tumor-specific. Our MUC1C binding molecule cross-reacts with the mouse version of MUC1C. Therefore, we should be able to detect potential on-target/off-tumor toxicity in the preclinical mouse model. However, we have not observed any toxicity in the preclinical animal experiments.

Early Stage Discovery Programs

We believe that our suite of next-generation gene engineering technologies can enable further pipeline expansion beyond those products currently in development. In addition to CAR-T therapy for oncology, we can use our technologies to produce TCR-T and CAR-NK therapies for oncology. We also believe that CAR-T therapy shows promise when applied to other therapeutic areas, potentially including autoimmune, infectious disease and allergy. Our technologies can also be used across other cell types, such as B-cells, HSCs and their derivatives and other T cells, such as regulatory T cells (Tregs).

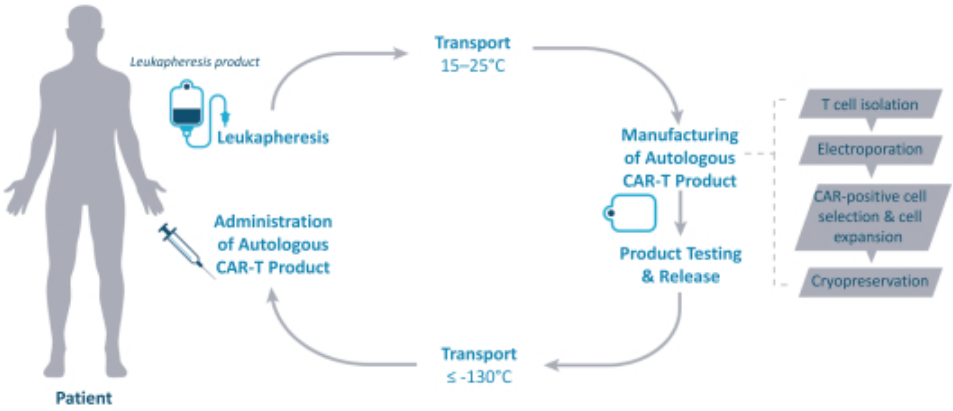
One example of our non-oncology applications is P-HBB-101, an autologous gene therapy product candidate that is designed to deliver genetically modified HSCs to patients to potentially treat sickle cell disease. We have leveraged similar transgene construction and manufacturing strategies as those in our CAR-T program and believe our technology confers multiple benefits over other gene therapies, including the ability to deliver a highly purified product and the elimination of risks associated with using viral vectors.

Our Manufacturing Processes

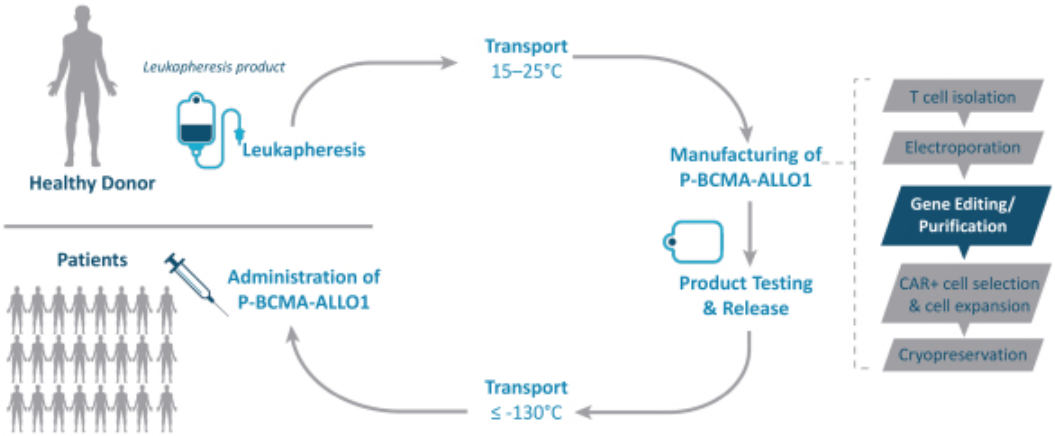
Our autologous CAR-T product candidates consist of patient T cells genetically engineered to express CAR molecule and other genes. PBMCs are harvested by a standard leukapheresis procedure at the enrolling hospital. Immediately following the procedure, leukapheresis cells are transported fresh to the manufacturing site.

Manufacturing of autologous CAR-T product candidates includes T cell isolation via positive selection, electroporation of piggyBac DNA transposon transgene (encoding the CAR molecule gene, the DHFR positive

selection gene and the iCasp9-based safety switch gene) and piggyBac transposase RNA (the enzyme that mobilizes the piggyBac transposon transgene), CAR-positive T cell selection via methotrexate, and cell expansion. The final product is then bagged and cryopreserved. Following product release for administration, cryopreserved product candidates are shipped by courier to the pharmacy or applicable cell therapy facility of the enrolling study center where it is stored until time of administration.



The manufacturing process for our allogeneic product candidates is identical to the process for our autologous product candidates, except for the gene editing and a related additional purification step:



Contract Manufacturing

We work with a number of third-party contract manufacturers for production of our product candidates. For the manufacturing of P-BCMA-101 we currently have relationships with two global contract manufacturing companies, Lonza Group and WuXi AppTec, Inc., from which we receive clinical supplies and on which we may rely for commercial manufacturing. For our other product candidates, we are evaluating various third party manufacturers for clinical supply. We also work with a variety of suppliers to provide our manufacturing raw materials including media, DNA and RNA components. We believe that our relationships with our contract manufacturers and suppliers are good.

We are evaluating whether to build an internal pilot GMP manufacturing facility in San Diego adjacent to our offices to develop and manufacture preclinical materials and clinical supplies for Phase 1 and Phase 2 clinical trials in the future. We have an option to lease a facility adjacent to our offices. In the future, we may also build one or more commercial manufacturing facilities when our product candidates are approved, if ever.

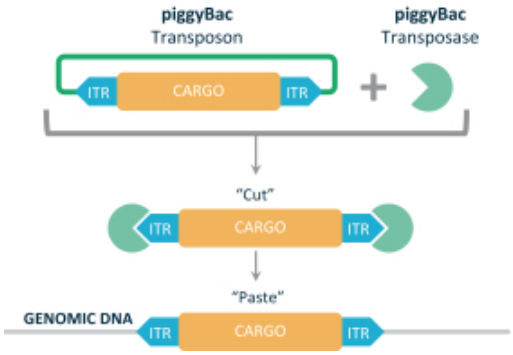
Our Proprietary Platform Technologies

We believe we are well-positioned to drive the continued advancement of CAR-T and gene therapy technology for the treatment of oncology indications, as well as for severe genetic and rare diseases. Notably, our non-viral piggyBac DNA Modification System technology and our Cas-CLOVER site-specific gene editing technology serve as the foundation of our development programs.

piggyBac DNA Modification System

DNA transposons are genetic elements that efficiently move from a plasmid to a chromosome via a cut and paste mechanism. DNA transposons have been used as a gene transfer method, including in CAR-T manufacturing. The piggyBac DNA Modification System is a proprietary non-viral gene engineering technology that can be used to add transgene DNA to the genome using the highly efficient Super piggyBac transposase enzyme, or SPB, a hyperactive enzyme that was genetically modified to enable very high efficiency transposition of piggyBac transposons. We believe piggyBac enables more efficient and precise transposition and enables multiple differentiated product attributes.

The image below depicts the piggyBac DNA Modification System:



Therapeutic genes encoded within the cargo region of the piggyBac DNA transposon transgene are flanked by non-translated inverted terminal repeat sequences, or ITRs, that are specifically recognized by the transposase enzyme for the highly efficient process of stably integrating the transgene cargo into specific sequences (TTAA nucleotides) in the genome. The transposase enzyme can be co-delivered to the cell as a protein or encoded in either DNA or RNA.

The piggyBac platform is our core technology used for the development of CAR-T and other gene therapy product candidates in our pipeline. We believe our piggyBac DNA Modification System enables multiple differentiated product attributes including:

- CAR-T product candidates with a high percentage of desirable T_{SCM} cells, leading to better engraftment and duration of response with the potential for re-response, as well as a better therapeutic index
- Very large cargo capacity (potentially greater than 20x lentivirus)—allows efficient delivery of large transgenes, including the possibility of multiple CAR or TCR molecules and incorporation of armoring strategies

- Non-viral delivery system that reduces the risk of mutagenesis and oncogenesis compared to viral delivery systems
- High insertion efficiency and stable transgene expression
- Shorter timelines and less costly manufacturing than viral methods

As discussed previously, the piggyBac transposon preferentially transposes transgenes into early T cells, including T_{SCM} cells. We believe retroviral transgene delivery methods, such as lentivirus and g-retrovirus, are not efficient at delivering transgenes into early memory T cells. This is a key differentiator that allows us to manufacture CAR-T products with a high percentage of T_{SCM} cells, giving them desirable characteristics.

While the genetic cargo capacity of viruses typically used in CAR-T manufacturing, such as lentivirus and g-retrovirus, is limited to approximately 10-20 kilobases, or kb, piggyBac has demonstrated cargo delivery of greater than 200 kb, allowing transfer of multiple useful genes. The massive cargo capacity of piggyBac permits incorporation of multiple genes into our product candidates to further enhance safety and potency, with all CAR-T cells carrying a CAR molecule gene, a safety switch gene and a selection gene.

PiggyBac ITRs act as strong insulators, ensuring stable transgene expression and eliminating concerns about oncogenesis. PiggyBac has shown low integration into intragenic regions, meaning that it is less likely to cause a detrimental mutation.

Additionally, piggyBac is estimated to have a significantly lower cost in production of GMP material and a much shorter timeline for GMP production as compared to GMP production of viral vectors.

The image below depicts our piggyBac transposon transgene approach for creating CAR-T product candidates:

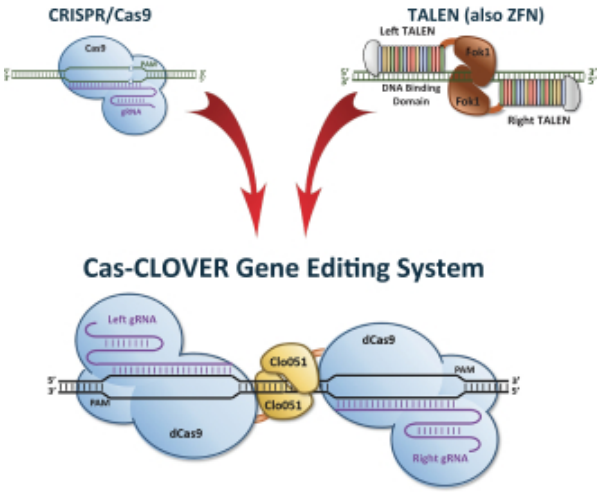
Cas-CLOVER Site-Specific Gene Editing Technology

The most widely used platform for gene editing is CRISPR (Clustered, Regularly Interspaced Short Palindromic Repeats) and an associated protein, Cas9 (CRISPR-associated protein-9). This gene editing technology is derived from a naturally occurring viral defense mechanism in bacteria. It works by binding the Cas9 enzyme to guide RNA, which can direct the Cas9 enzyme to a specific DNA sequence to make cuts in double-stranded DNA. Once the DNA is cut, the cell uses naturally occurring DNA repair mechanisms to rejoin the cut ends.

The CRISPR/Cas9 technology has been shown to result in unwanted off-target cutting, which means additional cutting at unintended sites that are often similar but not identical to the target DNA site. This off-target cutting can result in permanent mutations to the genomic DNA, which may unintentionally lead to detrimental mutations and oncogenesis, thereby creating significant safety concerns when used for manufacture of cell and gene therapies.

Another popular site-specific gene editing platform used for cell and gene therapy applications are the Transcription Activator-Like Effector Nucleases, or TALENs. They are constructed by fusing a TAL DNA-binding domain to a DNA cleavage domain, typically FokI, which functions as an obligate homodimer, meaning two half-sites must come together at the exact same place and the exact same time in order to make a cut. Given the requirement for two half-sites, this type of system is sometimes called a fully dimeric system. While TALEN technology can often cut specific sites in DNA with much higher fidelity than CRISPR/Cas9, it is relatively labor intensive and expensive to build.

We have developed gene editing technology that uses a proprietary obligate homodimer nuclease system named CLOVER, which consists of parts of the Type IIS restriction endonuclease, Clo051. Genome cutting by this enzyme is strictly dependent upon dimerization, which makes it a fully dimeric system and gives it precise site-specificity. Cas-CLOVER uses a Cas9 enzyme that has been permanently altered and is unable to cut DNA (called dCas9). The dCas9 acts only as a DNA binding protein when combined with an appropriate guide RNA. Cas-CLOVER combines the advantages of the first-generation CRISPR system (ease of design, low cost, multiplexing ability) with the advantages of the obligate homodimer nuclease systems (precise specificity).



Commercialization Plans

We possess global rights to our product candidates and discovery programs. We intend to retain significant development and commercialization rights to our product candidates and, if marketing approval is obtained, to commercialize our product candidates on our own, or potentially with a partner, in the United States and other regions. We currently have no sales, marketing, or commercial product distribution capabilities and have no experience as a company in marketing products. We plan to build the necessary infrastructure and capabilities over time for the United States, and potentially other regions, following further advancement of our product candidates. Clinical data, the size of the addressable patient population, the size of the commercial infrastructure and manufacturing needs may all influence or alter our commercialization plans.

Competition

The biotechnology industry, and specifically the CAR-T and gene therapy sciences, are characterized by intense and rapidly changing competition to develop new technologies and proprietary products. While we believe that our proprietary approach and scientific expertise in CAR-T and gene therapies provide us with competitive advantages, we face potential competition from many different sources, including larger and better-funded pharmaceutical companies, as well as academic and research institutions. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are more effective, safer, have fewer or less severe side effects, are more convenient, or cost less than any products that we may develop. The key competitive factors affecting the success of our programs are likely to be their efficacy, safety, convenience and cost.

There are other organizations currently working toward commercializing existing therapies and/or new therapies for our initially selected indications. If these efforts are successful their product candidates are approved or marketed prior to ours, it is possible they may increase the barriers to adoption of our product candidates.

Due to the promising clinical therapeutic effect of CAR-T product candidates in clinical trials, we anticipate direct competition from other organizations developing advanced other T cell therapies and other types of oncology therapies. This would include companies in the CAR-T space including: Adaptimmune Therapeutics plc, Allogene, Inc., Autolus Ltd., Bellicum Pharmaceuticals Inc., Bluebird Bio, Inc., Cellectis S.A., Janssen Pharmaceuticals Inc., Juno Therapeutics, Inc. (which was recently acquired by Celgene Corporation), Kite Pharma, Inc. (a Gilead Sciences, Inc. company), Nanjing Legend Biotech, and Novartis AG.

Immunotherapy and gene therapy approaches are further being pursued by several smaller biotechnology companies as well as larger pharmaceutical companies. We also face competition from non-cell-based treatments offered by companies such as Amgen Inc., AstraZeneca plc, Bristol-Myers Squibb Company, F. Hoffman-La Roche AG, GlaxoSmithKline plc, Merck & Co., Inc. and Pfizer Inc. Many of our competitors, either alone or with their collaboration partners, have substantially greater financial, technical and other resources, such as larger research and development staff and/or greater expertise in research and development, manufacturing, preclinical testing and conducting clinical trials.

In addition, smaller or early-stage companies may compete with us through collaborative arrangements with more established companies. Competition may increase further as a result of advances in the commercial applicability of technologies and greater availability of capital for investment in these enterprises. Mergers and acquisitions in the pharmaceutical, biotechnology and gene therapy industries are prevalent and may result in even more resources being concentrated among a smaller number of our competitors. Our 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.

Intellectual Property

Intellectual property is of vital importance in our field and in biotechnology generally. We seek to protect and enhance proprietary technology, inventions, and improvements that are commercially important to the development of our business by seeking, maintaining, and defending patent rights, whether developed internally, acquired or licensed from third parties. We will also seek to rely on regulatory protection afforded through orphan drug designations, inclusion in expedited development and review, data exclusivity, market exclusivity and patent term extensions where available.

Our intellectual property estate is designed to provide multiple layers of protection, including: (1) patent rights with claims directed to platform technologies; (2) patent rights with claims directed to core components used in our products; (3) patent rights covering specific products; (4) patent rights covering methods of treatment for therapeutic indications; (5) patent rights covering methods of use for core components and platform technologies; and (6) patent rights covering innovative manufacturing processes. We also rely on trade secrets that may be important to the development of our business.

We believe our current layered patent estate, together with our efforts to develop and patent next generation technologies, provides us with substantial intellectual property protection.

We have filed or will file for patent protection in the United States and internationally for P-BCMA-101, P-PSMA-101, P-BCMA-ALLO1 and P-MUC1C-101. However, the area of patent and other intellectual property rights in biotechnology is an evolving one with many risks and uncertainties.

With respect to the platform technologies and core components described above (e.g., T_{SCM} manufacturing method, genetically-modified HSC manufacturing method, inducible safety switch, piggyBac DNA Modification System, Cas-CLOVER gene editing technology, armoring strategies and nanoparticle delivery methods) the intellectual property estate is comprised predominantly of company-owned or company-acquired intellectual property. We expect to file additional patent applications in support of current and new product candidates as well as new platform and core technologies. Our commercial success will depend in part on obtaining and

maintaining patent protection and trade secret protection of our current and future product candidates and the methods used to develop and manufacture them, as well as successfully defending these patents against third-party challenges and operating without infringing on the proprietary rights of others. Our ability to stop third parties from making, using, selling, offering to sell or importing our products depends on the extent to which we have rights under valid and enforceable patents or trade secrets that cover these activities. We cannot be sure that patents will be granted with respect to any of our pending patent applications or with respect to any patent applications filed by us in the future, nor can we be sure that any of our existing patents or any patents that may be granted to us in the future will be commercially useful in protecting our product candidates, discovery programs and processes. For this and more comprehensive risks related to our intellectual property, please see the section titled "Risk Factors—Risks Related to Our Intellectual Property."

The term of individual patents depends upon the legal term of the patents in the countries in which they are obtained. In most countries in which we file, including the United States, the patent term is 20 years from the earliest date of filing a non-provisional patent application. In the United States, a patent's term may be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the USPTO in examining and granting a patent, or may be shortened if a patent is terminally disclaimed over an earlier filed patent or delays on the part of a patentee. In the United States, the patent term of a patent that covers an FDA-approved drug may also be eligible for patent term extension, which permits patent term restoration as compensation for the patent term lost during the FDA regulatory review process. The Hatch-Waxman Act permits a patent term extension of up to five years beyond the expiration of the patent. The length of the patent term extension is related to the length of time the drug is under regulatory review. Patent term extension cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval, only one patent applicable to an approved drug may be extended and only those claims covering the approved drug, a method for using it, or a method for manufacturing it may be extended. Similar provisions are available in Europe and other foreign jurisdictions to extend the term of a patent that covers an approved drug. In the future, if and when our products receive FDA approval, we expect to apply for patent term extensions on patents covering those products. We plan to seek patent term extensions to any of our issued patents in any jurisdiction where these are available, however there is no guarantee that the applicable authorities, including the FDA in the United States, will agree with our assessment of whether such extensions should be granted, and if granted, the length of such extensions. For more information regarding the risks related to our intellectual property, see the section titled "Risk Factors —Risks Related to Our Intellectual Property."

In some instances, we submit patent applications directly with the USPTO as provisional patent applications. Provisional applications for patents were designed to provide a lower-cost first patent filing in the United States. Corresponding non-provisional patent applications must be filed not later than 12 months after the provisional application filing date. The corresponding non-provisional application benefits in that the priority date(s) of the patent application is/are the earlier provisional application filing date(s), and the patent term of the finally issued patent is calculated from the later non-provisional application filing date. This system allows us to obtain an early priority date, add material to the patent application(s) during the priority year, obtain a later start to the patent term and to delay prosecution costs, which may be useful in the event that we decide not to pursue examination in an application. While we intend to timely file non-provisional patent applications relating to our provisional patent applications, we cannot predict whether any such patent applications will result in the issuance of patents that provide us with any competitive advantage.

We file U.S. non-provisional applications and Patent Cooperation Treaty, or PCT, applications that claim the benefit of the priority date of earlier filed provisional applications, when applicable. The PCT system allows a single application to be filed within 12 months of the original priority date of the patent application, and to designate all of the 152 PCT member states in which national patent applications can later be pursued based on the international patent application filed under the PCT. The PCT searching authority performs a patentability search and issues a non-binding patentability opinion which can be used to evaluate the chances of success for the national applications in foreign countries prior to having to incur the filing fees. Although a PCT application does not issue as a patent, it allows the applicant to seek protection in any of the member states through national-

phase applications. At the end of the period of two and a half years from the first priority date of the patent application, separate patent applications can be pursued in any of the PCT member states either by direct national filing or, in some cases by filing through a regional patent organization, such as the European Patent Organization. The PCT system delays expenses, allows a limited evaluation of the chances of success for national/regional patent applications and enables substantial savings where applications are abandoned within the first two and a half years of filing.

For all patent applications, we determine claiming strategy on a case-by-case basis. Advice of counsel and our business model and needs are always considered. We file patents containing claims for protection of all useful applications of our proprietary technologies and any products, as well as all new applications and/or uses we discover for existing technologies and products, assuming these are strategically valuable. We continuously reassess the number and type of patent applications, as well as the pending and issued patent claims to ensure that maximum coverage and value are obtained for our processes, and compositions, given existing patent office rules and regulations. Further, claims may be modified during patent prosecution to meet our intellectual property and business needs.

We recognize that the ability to obtain patent protection and the degree of such protection depends on a number of factors, including the extent of the prior art, the novelty and non-obviousness of the invention, and the ability to satisfy the enablement requirement of the patent laws. In addition, the coverage claimed in a patent application can be significantly reduced before the patent is issued, and its scope can be reinterpreted or further altered even after patent issuance. Consequently, we may not obtain or maintain adequate patent protection for any of our future product candidates or for our technology platform. We cannot predict whether the patent applications we are currently pursuing will issue as patents in any particular jurisdiction or whether the claims of any issued patents will provide sufficient proprietary protection from competitors. Any patents that we hold may be challenged, circumvented or invalidated by third parties.

In addition to patent protection, we also rely on trademark registration, trade secrets, know how, other proprietary information and continuing technological innovation to develop and maintain our competitive position. We seek to protect and maintain the confidentiality of proprietary information to protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection. Although we take steps to protect our proprietary information and trade secrets, including through contractual means with our employees and consultants, third parties may independently develop substantially equivalent proprietary information and techniques or otherwise gain access to our trade secrets or disclose our technology. Thus, we may not be able to meaningfully protect our trade secrets. It is our policy to require our employees, consultants, outside scientific collaborators, sponsored researchers and other advisors to execute confidentiality agreements upon the commencement of employment or consulting relationships with us. These agreements provide that all confidential information concerning our business or financial affairs developed or made known to the individual during the course of the individual's relationship with us is to be kept confidential and not disclosed to third parties except in specific circumstances. Our agreements with employees also provide that all inventions conceived by the employee in the course of employment with us or from the employee's use of our confidential information are our exclusive property. However, such confidentiality agreements and invention assignment agreements 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. To the extent that our consultants, contractors or collaborators use intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting trade secrets, know-how and inventions. For more information regarding the risks related to our intellectual property, see the section titled "Risk Factors—Risks Related to Our Intellectual Property."

The patent positions of biotechnology companies like ours are generally uncertain and involve complex legal, scientific and factual questions. Our commercial success will also depend in part on not infringing upon the proprietary rights of third parties. It is uncertain whether the issuance of any third-party patent would require us to alter our development or commercial strategies, or our products or processes, obtain licenses or cease certain

activities. Our breach of any license agreements or our failure to obtain a license to proprietary rights required to develop or commercialize our future products may have a material adverse impact on us. If third parties prepare and file patent applications in the United States that also claim technology to which we have rights, we may have to participate in interference or derivation proceedings in the USPTO to determine priority of invention. For more information, see the section titled "Risk Factors—Risks Related to Our Intellectual Property."

When available to expand market exclusivity, our strategy is to obtain, or license additional intellectual property related to current or contemplated development platforms, core elements of technology and/or product candidates.

Company-Owned Intellectual Property

P-BCMA-101 is covered by a number of filings, including a published PCT application filed in 2017 that is due to enter the national phase in January of 2019. National phase applications will be filed broadly to acquire worldwide coverage. Composition of matter claims issuing from this application would not expire before 2037.

P-PSMA-101 is covered by a number of filings, including, as of March 7, 2018, a pending provisional application that is due for conversion to a non-provisional application in 2019. Composition of matter claims issuing from this application would not expire before 2039.

P-BCMA-ALLO1 is covered by a number of filings, including, as of December 20, 2017, a pending provisional application that is due for conversion to a non-provisional application in 2018. Composition of matter claims issuing from this application would not expire before 2038.

P-MUC1C-101 is covered by a number of filings, including a published PCT application filed in 2017 that is due to enter the national phase in January of 2019. National phase applications will be filed broadly to acquire worldwide coverage. Composition of matter claims issuing from this application would not expire before 2037.

P-HBB-101 is covered by a number of filings, including, as of October 12, 2018, a provisional application that is due for conversion to a non-provisional application in 2019. Composition of matter claims issuing from this application would not expire before 2039.

Core components of each of these product candidates are protected by company-owned platform applications directed to Centyrin binders (P-BCMA-101 and P-PSMA-101) or VH binders (P-BCMA-ALLO1), early memory T-cells (including T_{SCM}) and methods of producing same (P-BCMA-101, P-PSMA-101, P-BCMA-ALLO1 and P-MUC1C-101), genetically-modified HSCs and methods of making same (P-HBB-101), piggyBac transposition systems (all products), inducible safety switches (all products), marker genes for facilitating simultaneous selection and expansion of modified cells for product manufacture (P-HBB-101), and self-cleaving peptides for trivalent transposon constructs (all products).

Acquired Intellectual Property

As a spin-out from Transposagen Biopharmaceuticals, Inc., or Transposagen, at inception, we acquired intellectual property related to piggyBac transposition systems and methods for use. This acquisition further comprised intellectual property related to next-generation gene editing systems and methods for use.

We acquired Vindico NanoBioTechnology, LLC (formerly known as Vindico NanoBioTechnology, Inc.) in October 2016. As part of this transaction, we acquired intellectual property related to polymer-based nanoparticle compositions and methods of use for delivery of, for example, gene therapy technologies.

License Agreements

License Agreement with Janssen Biotech Inc.

On August 3, 2015, we entered into a license agreement, or the Janssen Agreement, with Janssen Biotech Inc., or Janssen, pursuant to which we obtained an exclusive, sublicenseable, worldwide license to research, develop, manufacture and commercialize pharmaceutical products comprising autologous CAR-modified T-cells or any CAR-modified natural killer, or NK, or CAR-modified NK-like cells expressing certain Centyrin molecules or Centyrin CAR molecules, or CARTyrins, for the treatment or prevention of any disease in humans. We are obligated to use commercially reasonable efforts to develop and commercialize at least one such licensed product. We utilize these license rights in our P-BCMA-101 and P-PSMA-101 product candidates. Under the Janssen Agreement, we also have the right to engage with authorized third parties to screen Janssen's Centyrin library for agents that bind or modify targets of interest for our internal research and development purposes for potential use in a licensed product.

Pursuant to the Janssen Agreement, we paid Janssen an upfront fee of $0.2 million. We are required to pay Janssen up to an aggregate of $75.8 million upon the achievement of certain clinical, regulatory and sales milestones for the first licensed product and up to an aggregate of $46.8 million upon the achievement of certain clinical, regulatory and sales milestones for each licensed product thereafter. We are also obligated to pay, on a product-by-product and country-by-country basis, tiered royalties in the low single-digit percentage range on annual net sales, with the royalty rates varying depending on if there is a valid claim present within the licensed patent rights covering the licensed product in the applicable country in which the net sales occur. The royalty rates are also subject to reduction upon certain other events.

The Janssen Agreement will terminate on the last to expire royalty term, which is determined on a licensed product-by-licensed product and country-by-country basis, and is the later of (a) 10 years from the first commercial sale of the licensed product in the country, (b) the last to expire valid claim within the licensed patent in the country or (c) expiry of regulatory exclusivity granted by the prevailing governmental authority for the licensed product in the country. We also have the right to terminate the Janssen Agreement in its entirety or on a licensed product-by-licensed product basis, for any reason upon 60 days prior written notice to Janssen. Either party may terminate the Janssen Agreement upon a material breach by the other party that is not cured within 60 days after receiving written notice, or upon giving written notice within 30 days of the other party's bankruptcy. If we terminate the Janssen Agreement for convenience or Janssen terminates the Janssen Agreement due to our breach of our diligence obligations thereunder, Janssen will have an option to negotiate a license from us to research, develop and commercialize the Centyrin CAR molecules and/or Centyrin therapeutic molecules. If Janssen exercised this option, Janssen would be obligated to pay us a fee in the low six figure dollar range.

April 2017 Commercial License Agreement with TeneoBio, Inc.

On April 27, 2017, we entered into a commercial license agreement, or the 2017 TeneoBio Agreement, with TeneoBio, Inc., or TeneoBio, pursuant to which we obtained an exclusive, sublicenseable, worldwide license to use and develop pharmaceutical products comprising allogeneic T-cells expressing a CAR molecule containing certain heavy chain sequences provided by TeneoBio (a CAR containing a non-naturally occurring VH, or VCAR) for the treatment of human disease. We utilize these license rights in our P-BCMA-ALL01 product candidate.

Pursuant to the 2017 TeneoBio Agreement, we have paid TeneoBio $0.5 million through our selection of the antibodies licensed under the 2017 TeneoBio Agreement. We are required to pay TeneoBio up to an aggregate of $20.5 million upon the first achievement of certain clinical and regulatory milestones for any allogeneic product and up to an aggregate of $20.5 million upon the first achievement of certain clinical and regulatory milestones for any autologous product. We are also obligated to pay, on a product-by-product and country-by-country basis, a royalty in the low single-digit percentage on net sales of all licensed products.

The 2017 TeneoBio Agreement will terminate on the last to expire valid claim of the licensed patents in all countries. We may also terminate the 2017 TeneoBio Agreement at any time upon 60 days prior written notice to TeneoBio. Either party may terminate the 2017 TeneoBio Agreement upon a material breach by the other party that is not cured within 90 days after receiving written notice of the breach, or upon a bankruptcy of the other party.

August 2018 Commercial License Agreement with TeneoBio, Inc.

On August 3, 2018, we entered into a commercial license agreement, or the 2018 TeneoBio Agreement, with TeneoBio for the development and use of TeneoBio's human heavy chain only antibodies in CAR-T cell therapies. Under the terms of the 2018 TeneoBio Agreement, we have the option to obtain exclusive rights to research, develop and commercialize up to a certain number of targets from TeneoBio. We utilize these license rights in our P-BCMA-ALL01 product candidate.

Pursuant to the 2018 TeneoBio Agreement, we paid TeneoBio an upfront fee of $4.0 million. We are required to pay additional fees in the low to mid six figure dollar range upon (a) selecting exclusivity for a particular target, which restricts TeneoBio from licensing that particular target to a third party for a period of time, (b) continuing exclusivity for any selected target on each anniversary thereafter and (c) exercising our commercial option for each target. We are required to pay TeneoBio up to an aggregate of $31.0 million upon the first achievement of certain clinical and regulatory milestones for each product. We are also obligated to pay, on a product-by-product and country-by-country basis, a low single-digit percentage royalty on net sales of any licensed products. The royalty rate is subject to reduction upon certain events.

The 2018 TeneoBio Agreement will terminate on the last to expire valid claim of the licensed patents in all countries. We may also terminate the 2018 TeneoBio Agreement with respect to one or more targets at any time upon 60 days prior written notice. Either party may terminate the 2018 TeneoBio Agreement upon a material breach by the other party that is not cured within 90 days after receiving written notice of the breach, or upon a bankruptcy of the other party.

License Agreement with HMGU

On May 20, 2016, we entered into a patent license agreement, or the HMGU License Agreement, with Helmholtz-Zentrum München - Deutsches Forschungszentrum für Gesundheit und Umwelt GmbH, or HMGU, pursuant to which we obtained exclusive worldwide rights to research, develop, manufacture and commercialize products and services claimed by certain patent applications and patents owned by HMGU covering the nuclease Clo051 in certain fields of use, including human pharmaceutical products. We utilize these license rights in our Cas-CLOVER gene editing technology in relation to P-BCMA-ALLO1.

Pursuant to the HMGU License Agreement, we paid HMGU an upfront fee of $11,506, equal to €10,000 on the date of payment. We are required to pay HMGU annual maintenance fees credited against royalties due for the same year. We are also required to pay HMGU up to an aggregate of €1.7 million upon the first achievement of certain clinical and regulatory milestones for the first licensed product where Clo051 is part of the therapeutic agent and up to an aggregate of €0.9 million upon the first of certain clinical and regulatory milestones for the first licensed product where Clo051 is not part of the therapeutic agent. We are obligated to pay, on a licensed product-by-licensed product or licensed service-by-licensed service and country-by-country basis, royalties in the low single-digit percentage range on annual net sales, with the royalty rates varying depending on whether the licensed products are therapeutics or the licensed services are for therapeutic use and whether Clo051 is part of the therapeutic agent or used to generate the therapeutic agent. We currently use Clo051 as part of our gene engineering technology to generate our product candidates.

The HMGU License Agreement will terminate on the last to expire royalty term, which is determined on a licensed product-by-licensed product and country-by-country basis. We also have the right to terminate the

HMGU License Agreement upon giving written notice within 3 months prior to the end of a calendar year; provided, that if we terminate the HMGU License Agreement prior to December 31, 2018, we are obligated to pay HMGU a termination fee of €20,000. Either party may terminate the HMGU License Agreement upon a material breach by the other party that is not cured within six weeks after receiving written notice of the breach. The HMGU License Agreement terminates automatically if we become bankrupt.

License Agreements with Transposagen and Hera

We have also entered into license agreements with Transposagen and Hera in connection with the spin-out of our company from Transposagen. See the section titled "Certain Relationships and Related Party Transactions."

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 biologics 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 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 current Good Laboratory Practices, or GLP, regulation;
- submission to the FDA of an IND, which must become effective before clinical trials may begin and must be updated annually or when significant changes are made;
- approval by an independent Institutional Review Board, or IRB, or ethics committee at each treatment 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 Good Clinical Practices, or GCP; and
- FDA review and approval of the BLA to permit commercial marketing of the product for particular indications for use in the United States.

Preclinical and Clinical Development

Prior to beginning the first clinical trial with a product candidate, 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 RAC, of the NIH Office of Biotechnology Activities, or OBA, pursuant to the NIH Guidelines for Research Involving Recombinant DNA Molecules, or NIH Guidelines. 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 announced that it would no longer accept new human gene transfer protocols for review as 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.

- 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.

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 requirements. 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

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. The submission of a BLA requires payment of a substantial application user fee to FDA, unless a waiver or exemption applies, and the sponsor of an approved BLA is also subject to an annual program fee.

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. 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 requirements 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 treatment 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 Risk Evaluation and Mitigation Strategy, or 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 product 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 4 postmarket 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.

Expedited Development and Review Programs

The FDA offers a number of expedited development and review programs for qualifying product candidates. The fast track program is intended to expedite or facilitate the process for reviewing new products that meet certain criteria. Specifically, new 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. Fast track designation applies to the combination of the product and the specific indication for which it is being studied. The sponsor of a fast track product has opportunities for frequent interactions with the review team during product development and, once a BLA is submitted, the product may be eligible for priority review. A fast track product may also be eligible for rolling review, where the FDA may consider for review sections of the BLA on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the BLA, the FDA agrees to accept sections of the BLA and determines that the schedule is acceptable, and the sponsor pays any required user fees upon submission of the first section of the BLA.

A product intended to treat a serious or life-threatening disease or condition may also be eligible for breakthrough therapy designation to expedite its development and review. A product can receive breakthrough therapy designation if preliminary clinical evidence indicates that the product may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. The designation includes all of the fast track program features, as well as more intensive FDA interaction and guidance beginning as early as Phase 1 and an organizational commitment to expedite the development and review of the product, including involvement of senior managers.

Any marketing application for a biologic submitted to the FDA for approval, including a product with a fast track designation and/or breakthrough therapy designation, may be eligible for other types of FDA programs

intended to expedite the FDA review and approval process, such as priority review and accelerated approval. A product is eligible for priority review if it has the potential to provide a significant improvement in the treatment, diagnosis or prevention of a serious disease or condition compared to marketed products. For products containing new molecular entities, priority review designation means the FDA's goal is to take action on the marketing application within six months of the 60-day filing date (compared with ten months under standard review).

Additionally, products studied for their safety and effectiveness in treating serious or life-threatening diseases or conditions may receive accelerated approval upon a determination that the product has an effect on 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. As a condition of accelerated approval, the FDA will generally require the sponsor to perform adequate and well-controlled post-marketing clinical studies to verify and describe the anticipated effect on irreversible morbidity or mortality or other 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.

In 2017, FDA established a new regenerative medicine advanced therapy, or RMAT, designation as part of its implementation of the 21st Century Cures Act. The RMAT designation is intended to fulfill the 21st Century Cures Act requirement that FDA facilitate an efficient development program for, and expedite review of, any drug that meets the following criteria: (1) it qualifies as a RMAT, which is defined as a cell therapy, therapeutic tissue engineering product, human cell and tissue product, or any combination product using such therapies or products, with limited exceptions; (2) it is intended to treat, modify, reverse, or cure a serious or life-threatening disease or condition; and (3) preliminary clinical evidence indicates that the drug has the potential to address unmet medical needs for such a disease or condition. Like breakthrough therapy designation, RMAT designation provides potential benefits that include more frequent meetings with FDA to discuss the development plan for the product candidate and eligibility for rolling review and priority review. Products granted RMAT designation may also be eligible for accelerated approval on the basis of a surrogate or intermediate endpoint reasonably likely to predict long-term clinical benefit, or reliance upon data obtained from a meaningful number of sites, including through expansion to additional sites. Once approved, when appropriate, the FDA can permit fulfillment of post-approval requirements under accelerated approval through the submission of clinical evidence, clinical studies, patient registries, or other sources of real world evidence such as electronic health records; through the collection of larger confirmatory datasets; or through post-approval monitoring of all patients treated with the therapy prior to approval.

Fast track designation, breakthrough therapy designation, priority review, accelerated approval, and RMAT designation do not change the standards for approval but may expedite the development or approval process.

Orphan Drug Designation

Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biologic intended to treat a rare disease or condition, which is a disease or condition that affects fewer than 200,000 individuals in the United States, or more than 200,000 individuals in the United States for which there is no reasonable expectation that the cost of developing and making available in the United States a drug or biologic for this type of disease or condition 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. The orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review or approval process.

If a product that has orphan drug designation subsequently receives the first FDA approval for the disease for which it has such designation, the product is entitled to orphan drug exclusive approval (or 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. Orphan drug exclusivity does not prevent 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 fee.

A designated orphan drug may 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, exclusive marketing rights in the United States 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.

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 user fee requirements, under which FDA assesses an annual program fee for each product identified in an approved BLA. 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 a 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 existing product approvals;
- product seizure or detention, or refusal of the FDA 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 Reference Product Exclusivity

The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or collectively, the ACA, signed into law in 2010, includes a subtitle called the Biologics Price Competition and Innovation Act of 2009, or BPCIA, which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-approved reference biological product. To date, a number of biosimilars have been licensed under the BPCIA, and numerous biosimilars have been approved in Europe. 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. 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, recent 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.

Other U.S. Healthcare Laws and Compliance Requirements

In the United States, our activities are potentially subject to regulation by various federal, state and local authorities in addition to the FDA, including but not limited to, the Centers for Medicare and Medicaid Services, or CMS, other divisions of the U.S. Department of Health and Human Services (such as the Office of Inspector General and the Health Resources and Service Administration), the Department of Justice, or the DOJ, and individual U.S. Attorney offices within the DOJ, and state and local governments. For example, sales, marketing and scientific/educational grant programs may have to comply with the anti-fraud and abuse provisions of the Social Security Act, the false claims laws, the privacy and security provisions of the Health Insurance Portability and Accountability Act, or HIPAA, and similar state laws, each as amended, as applicable.

The 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, in whole or in part, under Medicare, Medicaid or other federal healthcare programs. The term remuneration has been interpreted broadly to include anything of value. The federal Anti-Kickback Statute has been interpreted to apply to arrangements between therapeutic product manufacturers on one hand and prescribers and purchasers on the other. There are a number of statutory exceptions and regulatory safe harbors protecting some common activities from prosecution. The exceptions and safe harbors are drawn narrowly and practices that involve remuneration that may be alleged to be intended to induce prescribing, purchasing or recommending may be subject to scrutiny if they do not qualify for an exception or safe harbor. Failure to meet all of the requirements of a particular applicable statutory exception or regulatory safe harbor does not make the conduct per se illegal under the federal Anti-Kickback Statute. Instead, the legality of the arrangement will be evaluated on a case-by-case basis based on a cumulative review of all of its facts and circumstances. Our practices, including our arrangements with physicians, may not in all cases meet all of the criteria for protection under a statutory exception or regulatory safe harbor.

Additionally, the intent standard under the federal Anti-Kickback Statute was amended by the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively, ACA, to a stricter standard such that a person or entity no longer needs to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation. In addition, the ACA codified case law that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the federal False Claims Act, or FCA.

The federal false claims and civil monetary penalty laws, including the FCA, which can be enforced by private citizens through civil qui tam actions, prohibit any person or entity from, among other things, knowingly presenting, or causing to be presented, a false or fraudulent claim for payment to, or approval by, the federal healthcare programs, including Medicare and Medicaid, 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. A claim includes “any request or demand” for money or property presented to the U.S. government. For instance, historically, pharmaceutical and other healthcare companies have been prosecuted under these laws for allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. Other companies have been prosecuted for causing false claims to be submitted because of the companies’ marketing of the product for unapproved, off-label, and thus generally non-reimbursable, uses.

HIPAA created additional federal criminal statutes that prohibit, among other things, 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, willfully obstructing a criminal investigation of a healthcare offense, 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. Like the federal Anti-Kickback Statute, the

ACA amended the intent standard for certain healthcare fraud statutes under HIPAA such that a person or entity no longer needs to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation.

Also, many states have similar, and typically more prohibitive, fraud and abuse statutes or regulations that apply to items and services reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payor. Additionally, to the extent that our product is sold in a foreign country, we may be subject to similar foreign laws.

We may be subject to data privacy and security regulations by both the federal government and the states in which we conduct our business. HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, or HITECH, and their implementing regulations, impose requirements relating to the privacy, security and transmission of individually identifiable health information on certain healthcare providers, healthcare clearinghouses, and health plans, known as covered entities, as well as independent contractors, or agents of covered entities that receive or obtain individually identifiable health information in connection with providing a service on behalf of a covered entity, known as a business associates. Among other things, HITECH makes HIPAA's privacy and security standards directly applicable to business associates. HITECH also created four new tiers of civil monetary penalties, amended HIPAA to make civil and criminal penalties directly applicable to business associates, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce HIPAA and seek attorneys' fees and costs associated with pursuing federal civil actions. In addition, many state laws govern the privacy and security of health information in specified circumstances, many of which differ from each other in significant ways, are often not pre-empted by HIPAA, and may have a more prohibitive effect than HIPAA, thus complicating compliance efforts.

In addition, many pharmaceutical manufacturers must calculate and report certain price reporting metrics to the government, such as average sales price and best price. Further, these prices for drugs may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors and by any future relaxation of laws that presently restrict imports of drugs from countries where they may be sold at lower prices than in the United States. It is difficult to predict how Medicare coverage and reimbursement policies will be applied to our products in the future and coverage and reimbursement under different federal healthcare programs are not always consistent. Medicare reimbursement rates may also reflect budgetary constraints placed on the Medicare program.

Additionally, the federal Physician Payments Sunshine Act, or the Sunshine Act, within the ACA, 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) report annually to CMS information related to certain payments or other transfers of value made or distributed to physicians 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 certain ownership and investment interests held by physicians and their immediate family members. In addition, many states also govern the reporting of payments or other transfers of value, many of which differ from each other in significant ways, are often not pre-empted, and may have a more prohibitive effect than the Sunshine Act, thus further complicating compliance efforts.

In order to distribute products commercially, we must comply with state laws that require the registration of manufacturers and wholesale distributors of drug and biological products in a state, including, in certain states, manufacturers and distributors who ship products into the state even if such manufacturers or distributors have no place of business within the state. Some states also impose requirements on manufacturers and distributors to establish the pedigree of product in the chain of distribution, including some states that require manufacturers and others to adopt new technology capable of tracking and tracing product as it moves through the distribution chain. Several states have enacted legislation requiring pharmaceutical and biotechnology companies to establish marketing compliance programs, file periodic reports with the state, make periodic public disclosures on sales,

marketing, pricing, clinical trials and other activities, and/or register their sales representatives, as well as to prohibit pharmacies and other healthcare entities from providing certain physician prescribing data to pharmaceutical and biotechnology companies for use in sales and marketing, and to prohibit certain other sales and marketing practices. All of our activities are potentially subject to federal and state consumer protection and unfair competition laws.

Ensuring business arrangements with third parties comply with applicable healthcare laws and regulations is a costly endeavor. If our operations are found to be in violation of any of the federal and state healthcare laws described above or any other current or future governmental regulations that apply to us, we may be subject to penalties, including without limitation, civil, criminal and/or administrative penalties, damages, fines, disgorgement, individual imprisonment, exclusion from participation in government programs, such as Medicare and Medicaid, injunctions, private "qui tam" actions brought by individual whistleblowers in the name of the government, or refusal to allow us to enter into government contracts, contractual damages, reputational harm, administrative burdens, diminished profits and future earnings, additional reporting obligations and oversight if we become subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws, and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations.

Coverage, Pricing and Reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of any product candidates for which we may obtain regulatory approval. In the United States and in foreign markets, 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. Coverage and adequate reimbursement from governmental healthcare programs, such as Medicare and Medicaid in the United States, and commercial payors are critical to new product acceptance.

Third-party payors decide which therapeutics they will pay for and establish reimbursement levels. Coverage and reimbursement by a third-party payor may depend upon a number of factors, including the third-party payor's determination that use of a therapeutic is:

- a covered benefit under its health plan;
- safe, effective and medically necessary;
- appropriate for the specific patient;
- cost-effective; and
- neither experimental nor investigational.

We cannot be sure that reimbursement will be available for any product that we commercialize and, if coverage and reimbursement are available, we cannot be sure that the level of reimbursement will be adequate. Coverage may also be more limited than the purposes for which the product is approved by the FDA or comparable foreign regulatory authorities. Limited coverage and less than adequate reimbursement may reduce the demand for, or the price of, any product for which we obtain regulatory approval.

Third-party payors are increasingly challenging the price, examining the medical necessity, and reviewing the cost-effectiveness of medical products, therapies and services, in addition to questioning their safety and efficacy. Obtaining reimbursement for our products may be particularly difficult because of the higher prices often associated with branded drugs and drugs administered under the supervision of a physician. We may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of our products, in addition to the costs required to obtain FDA approvals. Our product candidates

may not be considered medically necessary or cost-effective. Obtaining coverage and reimbursement approval of a product from a third-party payor is a time-consuming and costly process that could require us to provide to each payor supporting scientific, clinical and cost-effectiveness data for the use of our product on a payor-by-payor basis, with no assurance that coverage and adequate reimbursement will be obtained. A third-party payor's decision to provide coverage for a product does not imply that an adequate reimbursement rate will be approved. Additionally, in the United States there is no uniform policy among third-party payors for coverage or reimbursement. Third-party payors often rely upon Medicare coverage policy and payment limitations in setting their own coverage and reimbursement policies, but also have their own methods and approval processes. Therefore, one third-party payor's determination to provide coverage for a product does not assure that other payors will also provide coverage for the 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. If reimbursement is not available or is available only at limited levels, we may not be able to successfully commercialize any product candidate that we successfully develop.

Certain of our products, once approved, may be administered by a physician. Under currently applicable U.S. law, certain products not usually self-administered (including injectable drugs) may be eligible for coverage under Medicare through Medicare Part B. Medicare Part B is part of original Medicare, the federal health care program that provides health care benefits to the aged and disabled, and covers outpatient services and supplies, including certain pharmaceutical products, that are medically necessary to treat a beneficiary's health condition. As a condition of receiving Medicare Part B reimbursement for a manufacturer's eligible drugs or biologicals, the manufacturer is required to participate in other government healthcare programs, including the Medicaid Drug Rebate Program and the 340B Drug Pricing Program. The Medicaid Drug Rebate Program requires pharmaceutical manufacturers to enter into and have in effect a national rebate agreement with the Secretary of the Department of Health and Human Services as a condition for states to receive federal matching funds for the manufacturer's outpatient drugs furnished to Medicaid patients. Under the 340B Drug Pricing Program, the manufacturer must extend discounts to entities that participate in the program.

Different pricing and reimbursement schemes exist in other countries. In the European Union, governments influence the price of pharmaceutical products through their pricing and reimbursement rules and control of national health care systems that fund a large part of the cost of those products to consumers. Some jurisdictions operate positive and negative list systems under which products may only be marketed once a reimbursement price has been agreed. To obtain reimbursement or pricing approval, some of these countries may require the completion of clinical trials that compare the cost effectiveness of a particular product candidate to currently available therapies. Other member states allow companies to fix their own prices for medicines but monitor and control company profits. The downward pressure on health care costs has become intense. As a result, increasingly high barriers are being erected to the entry of new products. In addition, in some countries, cross-border imports from low-priced markets exert a commercial pressure on pricing within a country.

The marketability of any product candidates for which we receive regulatory approval for commercial sale may suffer if the government and third-party payors fail to provide coverage and adequate reimbursement. In addition, emphasis on managed care, the increasing influence of health maintenance organizations, and additional legislative changes in the United States has increased, and we expect will continue to increase, the pressure on healthcare pricing. The downward pressure on the rise in healthcare costs in general, particularly prescription medicines, medical devices and surgical procedures and other treatments, has become very intense. Coverage policies and third-party 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. In the United States, the pharmaceutical industry has been a particular focus of these efforts and has been significantly affected by major legislative initiatives.

For example, the ACA has substantially changed healthcare financing and delivery by both governmental and private insurers. Among the ACA provisions of importance to the pharmaceutical and biotechnology industries, in addition to those otherwise described above, are the following:

- 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 that began in 2011;
- an increase in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program, retroactive to January 1, 2010, to 23.1% and 13% of the average manufacturer price for most branded and generic drugs, respectively, and capped the total rebate amount for innovator drugs at 100% of the average manufacturer price;
- a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% (and 70% starting on 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 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 by, among other things, allowing states to offer Medicaid coverage to additional individuals and by adding new mandatory eligibility categories for individuals with income at or below 133% of the federal poverty level, thereby potentially increasing manufacturers' Medicaid rebate liability;
- 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;
- expansion of healthcare fraud and abuse laws, including the FCA and the federal Anti-Kickback Statute, new government investigative powers, and enhanced penalties for noncompliance;
- 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;
- requirements to report certain financial arrangements with physicians and teaching hospitals;
- a requirement to annually report certain information regarding drug samples that manufacturers and distributors provide to physicians;
- establishment of a Center for Medicare Innovation at CMS to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending; and
- a licensure framework for follow on biologic products.

Some of the provisions of the ACA have yet to be implemented, and there have been legal and political challenges to certain aspects of the ACA. Since January 2017, President Trump has signed two executive orders and other directives designed to delay, circumvent, or loosen certain requirements mandated by the ACA. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the ACA.

While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the ACA have been signed into law. In December 2017, the Tax Cuts and Jobs Act of 2017 was enacted which repeals, effective January 1, 2019, the tax penalty for an individual's failure to maintain ACA-mandated health insurance, 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 ACA-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, and the medical device excise tax on non-exempt medical devices. Further, the Bipartisan Budget Act of 2018, or the BBA, among other things, amends the ACA, 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 ACA qualified health plans and health insurance issuers under the ACA risk adjustment program in response to the outcome of federal district court litigation regarding the method CMS uses to determine this risk adjustment.

Other legislative changes have been proposed and adopted since the ACA was enacted. In August 2011, President Obama signed into law the Budget Control Act of 2011, which, among other things, included aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, which went into effect beginning on April 1, 2013 and, due to subsequent legislative amendments to the statute, including the BBA, will stay in effect through 2027 unless additional Congressional action is taken. In January 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 increasing legislative and enforcement interest in the United States with respect to specialty drug pricing practices. Specifically, there have been several recent U.S. Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under Medicare, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs. At the federal level, the Trump administration's budget proposal for fiscal year 2019 contains further drug price control measures that could be enacted during the 2019 budget process or in other future legislation, including, for example, measures to permit Medicare Part D plans to negotiate the price of certain drugs under Medicare Part B, to allow some states to negotiate drug prices under Medicaid, and to eliminate cost sharing for generic drugs for low-income patients. 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 already started the process of soliciting feedback on some of these measures and, at the same, is immediately implementing others under its existing authority. For example, in September 2018, CMS announced that it will allow Medicare Advantage Plans the option to use step therapy for Part B drugs beginning January 1, 2019, and in October 2018, CMS proposed a new rule that would require direct-to-consumer television advertisements of prescription drugs and biological products, for which payment is available through or under Medicare or Medicaid, to include in the advertisement the Wholesale Acquisition Cost, or list price, of that drug or biological product. Although a number of these, and other 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 states level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures.

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 framework for certain patients to access certain investigational new drug products that have completed a Phase I 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.

The Foreign Corrupt Practices Act

The Foreign Corrupt Practices Act, or the FCPA, prohibits any U.S. individual or business from paying, offering, or authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the United States to comply with accounting provisions requiring us to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations.

Additional Regulation

In addition to the foregoing, state and federal laws regarding environmental protection and hazardous substances, including the Occupational Safety and Health Act, the Resource Conservancy and Recovery Act and the Toxic Substances Control Act, affect our business. These and other laws govern our use, handling and disposal of various biological, chemical and radioactive substances used in, and wastes generated by, our operations. If our operations result in contamination of the environment or expose individuals to hazardous substances, we could be liable for damages and governmental fines. We believe that we are in material compliance with applicable environmental laws and that continued compliance therewith will not have a material adverse effect on our business. We cannot predict, however, how changes in these laws may affect our future operations.

Other Regulations

We are also subject to numerous federal, state and local laws relating to such matters as safe working conditions, manufacturing practices, environmental protection, fire hazard control, and disposal of hazardous or potentially hazardous substances. We may incur significant costs to comply with such laws and regulations now or in the future.

Research and Development Expenses

We have invested $9.3 million and $19.1 million in research and development for the years ended December 31, 2016 and 2017, respectively. We have invested $14.7 million and $21.1 million in research and development for the nine months ended September 30, 2017 and 2018, respectively.

Employees

As of September 30, 2018, we had 46 full-time employees, 22 of whom hold Ph.D. and/or M.D. degrees. Of these employees, 37 were engaged in research and development activities and nine were engaged in general and administrative activities. None of our employees are represented by labor unions or covered by collective bargaining agreements. We consider our relationship with our employees to be good.

Facilities

We currently lease 15,272 square feet of office and laboratory space in San Diego, California under a lease that expires on December 31, 2026. In addition, we have entered into a lease, with expected occupancy to

commence in the second quarter of 2019, for an additional 53,110 square feet of office and laboratory space in San Diego, this lease is anticipated to expire in December 2029. We have also entered into an option to lease agreement to lease an additional 14,747 square feet of space to potentially house a pilot manufacturing facility adjacent to our office and lab space. That option is exercisable until April 2019 and if exercised would be anticipated to expire in December 2029. We believe the additional lease space is sufficient to meet our facilities needs for the foreseeable future and that any additional space we may require will be available on commercially-reasonable terms.

Legal Proceedings

We are not currently a party to any material legal proceedings. From time to time, we may become involved in legal proceedings arising in the ordinary course of our business. Regardless of outcome, litigation can have an adverse impact on us due to defense and settlement costs, diversion of management resources, negative publicity, reputational harm and other factors.

MANAGEMENT

The following table sets forth information regarding our executive officers and directors as of September 30, 2018:

Name	Age	Position
Executive Officers and Employee Directors		
Eric Ostertag, M.D., Ph.D.	45	Chief Executive Officer and Director
Mark J. Gergen, J.D.	56	Chief Business Officer, Chief Financial Officer and Director
Matthew A. Spear, M.D.	52	Chief Medical Officer
Johanna M. Mylet, C.P.A.	32	Vice President, Finance
Non-Employee Directors		
David Hirsch, M.D., Ph.D.	48	Director
Sean Murphy	66	Director
John Schmid(1)	55	Director

(1) Member of the audit committee
(2) Member of the compensation committee
(3) Member of the nominating and corporate governance committee

Executive Officers

Eric M. Ostertag, M.D., Ph.D. Dr. Ostertag directed Poseida's spin out from Transposagen in February 2015 and has served as our Chief Executive Officer and as a member of our board of directors since May 2015. From October 2003 to July 2015, Dr. Ostertag founded and served as the Chief Executive Officer and President of Transposagen Biopharmaceuticals, Inc., a biotechnology company that commercializes early gene editing technology in the research reagent space. From March 2008 to July 2015, Dr. Ostertag co-founded and served as Chief Executive Officer and President of Vindico NanoBioTechnology, Inc., a biotechnology company engaged in the discovery, development, and commercialization of human therapeutics that are based on a nanometer-scale particulate technology. From 2006 to 2007, Dr. Ostertag co-founded and served as Executive Vice President of PhenoTech, Inc., a biotechnology company engaged in the discovery, development, and commercialization of reagents for diagnostic use in blood banks. Dr. Ostertag received both his Ph.D. in Molecular Biology and his M.D. from the University of Pennsylvania School of Medicine and his B.S. in Genetics from the University of Wisconsin-Madison. We believe that Dr. Ostertag's extensive experience and leadership in the life science industry qualifies him to serve on our board of directors.

Mark J. Gergen. Mr. Gergen has served as our Chief Business Officer and Chief Financial Officer since February 2018. From September 2016 to February 2018, Mr. Gergen initially served as the Senior Vice President and Chief Operating Officer and later as a Consultant for Halozyme, Inc., a publicly held biotechnology company focused on developing and commercializing cancer therapies that target the tumor microenvironment. From February 2013 to August 2016, Mr. Gergen served as Executive Vice President and Chief Operating Officer of Mirati Therapeutics, Inc., a publicly held clinical-stage biopharmaceutical company focused on developing a pipeline of targeted oncology products. From May 2005 to November 2012, Mr. Gergen served in senior management positions, including most recently as Senior Vice President, Corporate Development, at Amylin Pharmaceuticals, Inc., publicly held biopharmaceutical company that was focused on the development and commercialization of medicines to treat chronic diseases. From July 2003 to March 2005, Mr. Gergen served as Executive Vice President of CardioNet Inc., a cardiovascular diagnostic company. From June 1999 to May 2003, Mr. Gergen served initially as Chief Financial and Development Officer and later as Chief Restructuring Officer of Advanced Tissue Sciences, Inc., a company that engaged in the development and manufacturing of human-based tissue products for tissue repair and transplantation. From August 1994 to June 1999, Mr. Gergen held various leadership positions at Medtronic, Inc., a medical device company. Mr. Gergen received his J.D. from the

University of Minnesota Law School and his B.A. in Business Administration from Minot State University. We believe Mr. Gergen's extensive operational and transactional experience in the life science industry qualifies him to serve on our board of directors.

Matthew A. Spear, M.D. Dr. Spear has served as our Chief Medical Officer since June 2016. From April 2016 to July 2016, Dr. Spear served as Head of Clinical Development and Vice President at Sangamo Biosciences Inc., a biotechnology company focused on the research and development of genomic therapies. From July 2014 to March 2016, Dr. Spear served as Vice President, Clinical Development and Translational Medicine at Incyte Corporation, a research company specializing in oncology product development and innovative medicines. From January 2012 to July 2014, Dr. Spear served as Head of Oncology and Head of Biotherapeutics at Sunovion Pharmaceuticals, Inc., a pharmaceutical company focused on products for central nervous system disorders. From 2005 to 2011, Dr. Spear served as Chief Medical Officer, at Nereus Pharmaceuticals, Inc., or Nereus, a pharmaceutical company focused on identifying and synthesizing biologically active compounds and drug candidates derived from marine microbiology and integrated technologies. Prior to joining Nereus, Dr. Spear led multiple oncology clinical development programs at Pfizer Inc. and was an Associate Professor at the Keck School of Medicine of the University of Southern California, the University of California San Diego School of Medicine and the University of California San Diego Cancer Center. Dr. Spear has also served on the National Institute of Health and National Cancer Institute study sections, biotechnology and pharmaceutical advisory boards, various Institutional Review Boards and Scientific Review Committees, and scientific journal editorial review committees related to cancer, as well as authored numerous scientific papers and patents. Dr. Spear's residency and fellowship was conducted in the Massachusetts General Hospital Harvard University program. Dr. Spear received his M.D. from Stanford University Medical School and his B.A. in Biology from Johns Hopkins University.

Johanna M. Mylet, C.P.A. Ms. Mylet has served as our Vice President, Finance since March 2018 and as our Controller from June 2015 to March 2018. From April 2014 to June 2015, Ms. Mylet served as Controller at HUYA Biosciences, LLC, a pharmaceutical company focused on developing oncology and cardiovascular drug candidates sourced in China. From September 2008 to April 2014, Ms. Mylet served as Audit Manager of Grant Thornton, LLP, an accounting and advisory firm. Ms. Mylet received her B.S. in Accountancy from the University of San Diego and is a Certified Public Accountant.

Non-Employee Directors

David Hirsch, M.D., Ph.D. Dr. Hirsch has served as a member of our board of directors since March 2018. Since 2007, Dr. Hirsch has served as a Managing Director of Longitude Capital Management Co., LLC, a private investment firm Dr. Hirsch co-founded, where he focuses on investments in biotechnology. From February 2005 to July 2006, Dr. Hirsch served as a Vice President in the life sciences practice of Pequot Capital Management. From September 2001 to February 2005, Dr. Hirsch served as an Engagement Manager in the pharmaceutical practice of McKinsey & Company. Dr. Hirsch currently serves on the boards of directors of the following publicly held companies: Collegium Pharmaceutical, Inc., since 2012, Tricida, Inc., since 2016, and Molecular Templates, Inc., since 2017. Dr. Hirsch also serves on the boards of directors of the following private companies: Rapid Micro Biosystems, Inc. and Velicept Therapeutics, Inc. Dr. Hirsch previously served on the boards of directors of Civitas Therapeutics, Inc., Precision Therapeutics, Inc. and Zavante Therapeutics, Inc., all companies in the life sciences industry. Dr. Hirsch received his Ph.D. in Biology from the Massachusetts Institute of Technology, his M.D. from Harvard Medical School and his B.A. in Biology from The Johns Hopkins University. We believe that Dr. Hirsch's perspective and experience as an investor and board member in the life sciences industry, as well as his strong medical and scientific background, qualifies him to serve on our board of directors.

Sean Murphy. Mr. Murphy has served as a member of our board of directors since April 2018. Since August 2011, Mr. Murphy has been a senior advisor at Evercore Partners, an investment banking advisory firm. From December 1979 to March 2010, Mr. Murphy served as the head of corporate mergers and acquisitions and

business development at Abbott Laboratories, a company engaged in the discovery, development, manufacture and sale of a range of healthcare products. Mr. Murphy currently serves as a member of the leadership team at Malin Corporation plc and on the boards of directors of Immucor, Inc., Viamet Pharmaceuticals, Inc., Altan Pharma Limited, KNOW Bio, LLC and NeuVT Limited, all private companies in the life sciences industry. Mr. Murphy received his M.S. in Finance from the University of Illinois at Urbana-Champaign and his B.B.A. in Business Administration and Finance from Western Illinois University. We believe that Mr. Murphy's extensive experience and leadership in the life sciences and financial industries qualifies him to serve on our board of directors.

John P. Schmid, M.B.A. Mr. Schmid has served as a member of our board of directors since July 2018. From September 2013 to June 2015, Mr. Schmid served as Chief Financial Officer of Auspex Pharmaceuticals, Inc., a publicly held biopharmaceutical company that focuses on developing and commercializing medicines for the treatment of orphan diseases. From June 2004 to September 2013, Mr. Schmid co-founded Trius Therapeutics, a publicly held biopharmaceutical company focused on the discovery, development, and commercialization of antibiotics for serious infections, where he served as the Chief Financial Officer until its merger with Cubist Pharmaceuticals, Inc. From 1998 to 2003, Mr. Schmid served as the Chief Financial Officer of GeneFormatics, Inc., a biotechnology company. From 1995 to 1998, Mr. Schmid served as the Chief Financial Officer of Endonetics Inc., a medical device company. Mr. Schmid currently serves as a member of the boards of directors of AnaptysBio, Inc., Neos Therapeutics, Xeris Pharmaceuticals and Forge Therapeutics, Inc., all publicly held companies in the pharmaceutical industry. In addition, Mr. Schmid serves as chairman of the board of directors of Speak, Inc., a speakers bureau, which he helped found in 1989. From May 2016 to August 2018, Mr. Schmid served as a member of the board of directors of Patara Pharmaceuticals, a biotechnology company. Mr. Schmid received his M.B.A. from the University of San Diego and his B.A. in Economics from Wesleyan University. We believe that Mr. Schmid's extensive finance experience and leadership positions at multiple biopharmaceutical companies qualifies him to serve on our board of directors.

Family Relationships

There are no family relationships among any of our directors or executive officers.

Director Independence

We have applied to list our common stock on The Nasdaq Global Select Market. Our board of directors has determined that none of our non-employee directors has 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 rules of the Nasdaq Stock Market.

Our board of directors has appointed to serve as our lead independent director. As lead independent director, presides over periodic meetings of our independent directors, serves as a liaison between our Chief Executive Officer and the independent directors and performs such additional duties as our board of directors may otherwise determine and delegate.

Board Composition

Our board of directors currently consists of five members, who were elected pursuant to the amended and restated voting agreement that we entered into with certain holders of our common stock and certain holders of our preferred stock and the related provisions of our amended and restated certificate of incorporation. The voting agreement will terminate upon the completion of this offering, after which there will be no further contractual obligations regarding the election of our directors.

Immediately after the completion 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 directors whose terms then expire

will be subject to re-election to serve until the third annual meeting following re-election. As a result, only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. Our directors will be divided among the three classes as follows:

- the Class I directors will be and .
- the Class II directors will be and .
- the Class III director will be .

Our amended and restated certificate of incorporation and amended and restated bylaws that will be in effect upon the completion of this offering provide that only our board of directors can fill vacancies on the board, including due to increases in the size of the board. Any additional directorships resulting from an increase in the authorized number of directors would be placed among the three classes so that, as nearly as possible, each class will consist of one-third of the authorized number of directors.

The classification of our board of directors may have the effect of delaying or preventing changes in our control or management. See the section titled “Description of Capital Stock—Anti-Takeover Provisions—Certificate of Incorporation and Bylaw Provisions.”

Board Oversight of Risk

One of the key functions of our board of directors is informed oversight of our risk management process. In particular our board of directors is responsible for monitoring and assessing strategic risk exposure. Our executive officers are responsible for the day-to-day management of the material risks we face. Our board of directors administers its oversight function directly as a whole. Our board of directors will also administer its oversight through various standing committees, which will be constituted prior to the completion of this offering and address risks inherent in their respective areas of oversight. For example, our audit committee will be responsible for overseeing the management of risks associated with financial reporting, accounting and auditing matters; our compensation committee will oversee the management of risks associated with our compensation policies and programs; and our nominating and corporate governance committee will oversee the management of risks associated with director independence, conflicts of interest, composition and organization of our board of directors and director succession planning.

Board Committees

Our board of directors established an audit committee, a compensation committee and a nominating and corporate governance committee and may establish other committees to facilitate the management of our business. Members will serve on these committees until their resignation or until otherwise determined by our board of directors. Our board of directors and its committees will set schedules for meeting throughout the year and can also hold special meetings and act by written consent from time to time, as appropriate.

Our board of directors expects to delegate various responsibilities and authority to committees as generally described below. The committees will regularly report on their activities and actions to the full board of directors. Each member of each committee of our board of directors will qualify as an independent director in accordance with the listing standards of the Nasdaq Stock Market. Each committee of our board of directors has a written charter that was approved by our board of directors.

Upon the completion of this offering, copies of each charter will be posted on our website at www.poseida.com under the Investor Relations section. Information contained on our website is not incorporated by reference into this prospectus.

Audit Committee

The members of our audit committee are John Schmid, and , and Mr. Schmid is the chair of the audit committee.

Our audit committee will assist our board of directors with its oversight of the integrity of our consolidated financial statements; our compliance with legal and regulatory requirements; the qualifications, independence and performance of the independent registered public accounting firm; the design and implementation of our financial risk assessment and risk management. Among other things, our audit committee is responsible for reviewing and discussing with our management the adequacy and effectiveness of our disclosure controls and procedures. The audit committee also will discuss with our management and independent registered public accounting firm the annual audit plan and scope of audit activities, scope and timing of the annual audit of our consolidated financial statements, and the results of the audit, quarterly reviews of our consolidated financial statements and, as appropriate, initiates inquiries into certain aspects of our financial affairs.

Our audit committee is responsible for establishing and overseeing procedures for the receipt, retention and treatment of any complaints regarding accounting, internal accounting controls or auditing matters, as well as for the confidential and anonymous submissions by our employees of concerns regarding questionable accounting or auditing matters. In addition, our audit committee has direct responsibility for the appointment, compensation, retention and oversight of the work of our independent registered public accounting firm. Our audit committee has sole authority to approve the hiring and discharging of our independent registered public accounting firm, all audit engagement terms and fees and all permissible non-audit engagements with the independent auditor. Our audit committee will review and oversee all related person transactions in accordance with our policies and procedures.

Our board of directors has determined that Mr. Schmid qualifies as an audit committee financial expert within the meaning of SEC regulations and meets the financial sophistication requirements of the Nasdaq Stock Market listing standards. In making this determination, our board has considered Mr. Schmid's prior experience, business acumen and independence. Both our independent registered public accounting firm and management will periodically meet privately with our audit committee.

We believe that the composition and functioning of our audit committee complies with all applicable requirements of the Sarbanes-Oxley Act, and all applicable SEC and Nasdaq rules and regulations. We intend to comply with future requirements to the extent they become applicable to us.

Compensation Committee

The members of our compensation committee are , and , and is the chair of the compensation committee.

Each member of our compensation committee is independent under the rules and regulations of the SEC and the listing standards of the Nasdaq Stock Market applicable to compensation committee members. Our compensation committee will assist our board of directors with its oversight of the forms and amount of compensation for our executive officers (including officers reporting under Section 16 of the Exchange Act), the administration of our equity and non-equity incentive plans for employees and other service providers and certain other matters related to our compensation programs. Our compensation committee, among other responsibilities, evaluates the performance of our chief executive officer and, in consultation with him, evaluates the performance of our other executive officers (including officers reporting under Section 16 of the Exchange Act).

Nominating and Corporate Governance Committee

The members of our nominating and corporate governance committee are , and , and is the chair of the nominating and corporate governance committee.

Each member of our nominating and governance committee is independent under the rules and regulations of the SEC and the listing standards of the Nasdaq Stock Market, applicable to nominating and governance committee members. Our nominating and corporate governance committee will assist our board of directors with its oversight of and identification of individuals qualified to become members of our board of directors, consistent with criteria approved by our board of directors, and selects, or recommends that our board of directors selects, director nominees; develops and recommends to our board of directors a set of corporate governance guidelines and oversees the evaluation of our board of directors.

Code of Conduct

Our board of directors has adopted a Code of Business Conduct and Ethics, or the Code of Ethics, that will become effective upon the completion of this offering. The Code of Ethics will apply to all of our employees and directors. Upon the completion of this offering, the full text of the Code of Ethics will be posted on our website at www.poseida.com under the Investor Relations section. We intend to disclose future amendments to, or waivers of, the Code of Ethics, as and to the extent required by SEC regulations, at the same location on our website identified above or in public filings. Information contained on our website is not incorporated by reference into this prospectus, and you should not consider information contained on our website to be part of this prospectus or in deciding whether to purchase shares of our common stock.

Compensation Committee Interlocks and Insider Participation

None of our current or former executive officers serve as a member of the compensation committee. None of our officers serve, or have served during the last completed fiscal year, on the board of directors or compensation committee, or other committee serving an equivalent function, of any other entity that has one or more of its executive officers serving as a member of our board of directors or our compensation committee. For a description of transactions between us and members of our compensation committee and affiliates of such members, see the section titled “Certain Relationships and Related Party Transactions.”

EXECUTIVE AND DIRECTOR COMPENSATION

Our named executive officers for the year ended December 31, 2017, which consist of our principal executive officer and our two other most highly compensated executive officers as of December 31, 2017, are as follows: Eric Ostertag, M.D., Ph.D., our Chief Executive Officer; Matthew A. Spear, M.D., our Chief Medical Officer; and Nishan de Silva, M.D., our former President and Chief Operating Officer who resigned in March 2018.

In February 2018, we hired Mark J. Gergen as our Chief Financial Officer and Chief Business Officer. Although Mr. Gergen commenced services with us in 2018, we have included information in the following narrative regarding his compensation where it may be material to an understanding of our executive compensation program.

Summary Compensation Table

The following table shows information regarding the compensation of our named executive officers for services performed in our fiscal year ended December 31, 2017.

Name and principal position	Year	Salary ($)	Non-equity incentive plan compensation ($)(1)	All Other Compensation ($)(2)	Total ($)
Eric Ostertag, M.D., Ph.D. *President and Chief Executive Officer*	2017	$438,000	$ 326,875	$ 8,100	$772,975
Matthew A. Spear, M.D. *Chief Medical Officer*	2017	$375,550	$ 140,831	$ 19,505	$535,886
Nishan de Silva, M.D. *President and Chief Operating Officer (former)(3)*	2017	$387,000	$ 288,750	$ 8,100	$683,850

(1) Amounts shown represent annual performance-based bonuses. For more information, see the subsection below titled "—Annual Performance-Based Bonus Opportunity."
(2) Amounts shown represent the following: for Dr. Ostertag and Dr. de Silva, $8,100 each for 401(k) matching contributions and for Dr. Spear, $8,100 for 401(k) matching contributions and $11,405 for certain relocation benefits paid in connection with his relocation to San Diego.
(3) Dr. de Silva resigned in March 2018.

Annual Base Salary

The base salaries of all of our named executive officers are reviewed from time to time and adjusted when our board of directors or compensation committee determines an adjustment is appropriate. For our 2017 fiscal year, the base salary for Dr. Ostertag was $438,000, for Dr. Spear was $375,550 and for Dr. de Silva was $387,000. In February 2018, our board of directors approved a 3% increase in the base salaries of each of our named executive officers.

Annual Performance-Based Bonus Opportunity

In addition to base salaries, our named executive officers are eligible to receive annual performance-based cash bonuses, which are designed to provide appropriate incentives to our executives to achieve defined annual performance goals and to reward our executives for individual achievement towards these goals. The annual performance-based bonus each named executive officer is eligible to receive is generally based on the extent to which we achieve the corporate goals that our board of directors or compensation committee establishes each year. At the end of the year, our board of directors or compensation committee reviews our corporate performance and that of each executive officer and determines the actual bonus payout to be awarded to each of our named executive officers.

For 2017, the target bonus for Dr. Ostertag was 50% of base salary, for Dr. Spear was 30% of base salary and for Dr. de Silva was 50% of base salary. Our corporate performance objectives for 2017, as established by our board of directors, included accomplishments in research and development operations, finance and administrative goals and expansion in business development. In February 2018, our board of directors determined that we had attained a 125% overall achievement level of our corporate goals and accordingly awarded bonuses to our named executive officers at 125% of their target bonus level based on our achievements in 2017.

For 2016 our board of directors had generally approved 125% of target bonus award levels for members of our executive team. However, for Dr. Ostertag and Dr. de Silva, our board of directors initially awarded 100% of their respective 2016 target bonus amounts and required that we obtain additional financing as a condition to Dr. Ostertag and Dr. de Silva earning an additional 25% of their 2016 target bonus amounts. We obtained the additional financing during 2017, and in December 2017 our board of directors approved the award of the additional 25% of the 2016 target bonus amounts for Dr. Ostertag and Dr. de Silva, which were $53,125 and $46,875 respectively.

Equity Compensation

We award stock options to our named executive officers as the long-term incentive component of our compensation program. We typically grant equity awards to new hires upon their commencing employment with us. Stock options allow employees to purchase shares of our common stock at a price per share at least equal to the fair market value of our common stock on the date of grant and may or may not be intended to qualify as “incentive stock options” for U.S. federal income tax purposes. In the past, our board of directors has determined the fair market value of our common stock based upon inputs including valuation reports prepared by third-party valuation firms. Generally, our equity awards vest over four years, subject to the employee’s continued employment with us on each vesting date.

Dr. de Silva resigned in March 2018. In connection with his resignation in March 2018 our board of directors accelerated the vesting of 41,351 shares underlying Dr. de Silva’s previously granted and outstanding options.

In March 2018, we granted Mr. Gergen a stock option to purchase 375,000 shares of common stock in connection with the commencement of his employment with us. The option has an exercise price of $2.23 per share and vests as follows: 12.5% of the shares subject to the option vest on the six-month anniversary of the date of grant, and the remaining shares vest in 42 equal monthly installments thereafter, subject to Mr. Gergen remaining in service with us as of each vesting date.

Agreements with Our Named Executive Officers

Below are descriptions of our employment agreements and offer letters with our named executive officers and with Mr. Gergen. We entered into an executive employment agreement with Dr. de Silva that terminated in March 2018 in connection with his resignation. The employment of each of our named executive officers and Mr. Gergen is at will. For a discussion of the severance pay and other benefits to be provided in connection with a termination of employment and/or a change in control under the arrangements with our named executive officers and Mr. Gergen, see the subsection titled “—Potential Payments upon Termination or Change in Control” below.

Dr. Ostertag. We entered into an executive employment agreement with Dr. Ostertag in June 2015, which governs the terms of his employment with us. Pursuant to his agreement, Dr. Ostertag was entitled to an initial annual base salary of $400,000 (which has been subsequently increased, as described above), and is eligible to receive an annual performance bonus with a target amount of 50% of his base salary. In addition, Dr. Ostertag’s agreement provided for the grant of a stock option to purchase 1,405,944 shares of our common stock, which was granted in 2015.

Dr. Spear. We entered into an offer letter with Dr. Spear in June 2016, which governs the terms of his employment with us. Pursuant to his offer letter, Dr. Spear was entitled to an initial annual base salary of $370,000 (which has been subsequently increased, as described above), and is eligible to receive an annual performance bonus with a target amount of 30% of his base salary. In addition, Dr. Spear's agreement provided for the grant of a stock option to purchase 180,000 shares of our common stock, which was granted in 2016.

Mr. Gergen. We entered into an executive employment agreement with Mr. Gergen in February 2018, which governs the terms of his employment with us. Pursuant to his agreement, Mr. Gergen is entitled to an initial annual base salary of $390,000 and is eligible to receive an annual performance bonus with a target amount of 40% of his base salary. In addition, Mr. Gergen's agreement provided for the grant of a stock option to purchase 375,000 shares of our common stock, which was granted in 2018 and is described under the subsection titled "—Equity Compensation" above.

Potential Payments upon Termination or Change in Control

Regardless of the manner in which a named executive officer's service terminates, each named executive officer is entitled to receive amounts previously earned during his term of service, including unpaid salary and cash out of unused vacation. In addition, Dr. Ostertag and Mr. Gergen are entitled to certain severance benefits under their executive employment agreements, subject to their execution of a release of claims, returning of all company property, compliance with post-termination obligations and resignation from positions with us.

Dr. Ostertag. Pursuant to his employment agreement, if we terminate Dr. Ostertag's employment without cause or he resigns for good reason, then he will be entitled to receive continued payment of his then-current base salary for 12 months. In addition, we are required to pay the premiums for Dr. Ostertag and his dependents of group health insurance COBRA continuation coverage for up to 12 months. Notwithstanding the foregoing, if we terminate Dr. Ostertag's employment without cause or Dr. Ostertag resigns for good reason within one month prior to or one year following a change in control, Dr. Ostertag will instead be entitled to a lump sum cash payment equal to his then-current base salary for 12 months, immediate vesting of all outstanding options and restricted stock and the extension of the option exercise period for 24 months and payment of premiums for Dr. Ostertag and his dependents of group health insurance COBRA continuation for up to 12 months. Additionally, pursuant to his agreement, Dr. Ostertag is also entitled to certain tax gross-up payments with respect to any benefits he receives in connection with a change in control.

Dr. de Silva. Dr. de Silva's executive employment agreement provided for certain severance benefits upon a termination without cause or a resignation for good reason. Dr. de Silva's resignation in March 2018 did not qualify for these severance payments. In connection with Dr. de Silva's resignation in March 2018, our board of directors accelerated the vesting of 41,351 of the options previously granted to Dr. de Silva.

Mr. Gergen. Pursuant to his employment agreement, if we terminate Mr. Gergen's employment without cause or he resigns for good reason, then he will be entitled to receive continued payment of his then-current base salary for six months. In addition, we shall pay the premiums for Mr. Gergen and his dependents of group health insurance COBRA continuation coverage for up to six months. Notwithstanding the foregoing, if we terminate Mr. Gergen's employment without cause or Mr. Gergen resigns for good reason within one month prior to or one year following a change in control, Mr. Gergen will instead be entitled to a lump sum cash payment equal to his then-current base salary for nine months, immediate vesting of all outstanding options and payment of premiums for Mr. Gergen and his dependents of group health insurance COBRA continuation for up to nine months.

For purposes of Dr. Ostertag's and Mr. Gergen's employment agreements, the following definitions apply:

- "Cause" for termination means that we have determined in our sole discretion that the executive has engaged in any of the following: (i) a material breach of any covenant or condition under his employment agreement or any other agreement between the parties; (ii) any act constituting dishonesty, fraud, immoral

or disreputable conduct (and, with respect to Mr. Gergen, any act constituting insubordination); (iii) any conduct which constitutes a felony under applicable law; (iv) violation of any written company policy or any act of misconduct; (v) negligence or incompetence in the performance of the executive's duties or failure to perform the executive's duties in a manner satisfactory to us after the expiration of 10 days without cure after written notice of the failure; or (vi) breach of fiduciary duty (and, with respect to Mr. Gergen, breach of the duty of loyalty).

- "Good Reason" for resignation means the occurrence of any of the following without the executive's prior written consent: (i) a material reduction in the executive's base salary of at least 10% (unless pursuant to a salary reduction program applicable generally to similarly situated employees); (ii) relocation of the executive's principal place of employment to a place that is more than 35 miles for Dr. Ostertag or 50 miles for Mr. Gergen from his then-current principal place of employment immediately prior to the relocation; or (iii) the assignment to the executive of any duties or responsibilities which result in the material diminution of his then current position. Notwithstanding the foregoing, in order to resign for Good Reason, the executive must (1) provide written notice to us within 30 days after the first occurrence of the event giving rise to Good Reason, (2) allow us at least 30 days from receipt of the written notice to cure the event, and (3) if the event is not reasonably cured within the period, the executive's resignation from all positions held with us is effective not later than 30 days after the expiration of the cure period.
- "Change in Control" means (i) a sale, lease, exchange or other transfer of all or substantially all of our assets; (ii) a merger or consolidation in which we are not the surviving corporation (unless the holders of our outstanding voting stock immediately prior to the transaction own, immediately after the transaction, securities representing at least 50% of the voting power of the corporation or other entity surviving such transaction); (iii) a reverse merger in which we are the surviving corporation but the shares of our common stock outstanding immediately preceding the merger are converted into other property (unless the holders of our outstanding voting stock immediately prior to the transaction own, immediately after the transaction, securities representing at least 50% of our voting power); (iv) any transaction in which in excess of 50% of our voting power is transferred; or (v) the acquisition by any person or entity of more than 50% of our combined voting power.

Employee Benefits and Perquisites

Our named executive officers are eligible to participate in our health and welfare plans to the same extent as are all full-time employees generally. We generally do not provide our named executive officers with perquisites or other personal benefits.

Nonqualified Deferred Compensation

Our named executive officers did not participate in, or earn any benefits under, a nonqualified deferred compensation plan sponsored by us during the fiscal year ended December 31, 2017. Our board of directors may elect to provide our officers and other employees with nonqualified defined contribution or other nonqualified deferred compensation benefits in the future if it determines that doing so is in our best interests.

Retirement Benefits

We have established a 401(k) tax-deferred savings plan, which permits participants, including our named executive officers, to make contributions by salary deduction pursuant to Section 401(k) of the Code. We are responsible for administrative costs of the 401(k) plan. We currently match 50% of the first 6% of the participant's eligible compensation contributed to the 401(k) plan, up to a cap of $8,100. We may, at our discretion, make additional matching or profit sharing contributions to the 401(k) plan.

Outstanding Equity Awards at Fiscal Year-End

The following table presents information concerning outstanding equity awards held by our named executive officers as of December 31, 2017, all of which were granted under the 2015 Plan.

			Option Awards			
Name		Vesting Commencement Date	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price(1)	Option Expiration Date
Eric Ostertag, M.D., Ph.D.	(2)	5/4/2015	195,270	195,270	$0.264	5/3/2020
	(3)	2/29/2016	20,212	87,583	$1.034	2/28/2021
	(3)	2/29/2016	34,164	148,042	$ 0.94	2/28/2026
Matthew A. Spear, M.D.	(3)	6/27/2016	67,500	112,500	$ 1.06	6/19/2026
Nishan de Silva, M.D.(4)	(2)	5/4/2015	62,028	103,378	$ 0.24	5/3/2025
	(3)	2/29/2016	24,048	124,583	$ 0.94	2/28/2026

(1) All of the option awards were granted with a per share exercise price equal to the fair market value of one share of our common stock on the date of grant, as determined in good faith by our board of directors. Options granted to Dr. Ostertag were granted with a per share exercise price equal to 110% of the fair market value of one share of our common stock on the applicable grant date given his combined voting power of our stock exceeded 10% at the time of grant.
(2) Options vest as follows: 1/6th the of shares vest on the six month anniversary of the vesting commencement date and the remaining shares vest in 30 equal monthly installments
(3) Options vest as follows: 12.5% of the shares vest on the six month anniversary of the vesting commencement date and the remaining shares vest in 42 equal monthly installments.
(4) Dr. de Silva resigned in March 2018. In connection with his resignation, our board of directors accelerated the vesting of 41,351 shares underlying Dr. de Silva's option grants. Following his resignation, Dr. de Silva exercised his vested stock options and purchased an aggregate of 66,819 shares of our common stock, at a weighted-average exercise price of $0.29 per share. In addition, 115,000 shares underlying Dr. de Silva's unvested options were forfeited and returned to the 2015 Plan upon his resignation.

There were no repricings or cancellations of any of our named executive officers' outstanding equity awards during the fiscal year ended December 31, 2017. We did not engage in modifications to any of our named executive officers' outstanding equity awards during the fiscal year ended December 31, 2017.

Equity Plans

2018 Equity Incentive Plan

Our board of directors adopted our 2018 Plan in 2018 and our stockholders approved our 2018 Plan in 2018. Our 2018 Plan is a successor to and continuation of our 2015 Plan. No stock awards may be granted under the 2018 Plan until the date of the underwriting agreement related to this offering. Once the 2018 Plan is effective, no further grants will be made under the 2015 Plan.

Awards. Our 2018 Plan provides for the grant of incentive stock options, or ISOs, within the meaning of Section 422 of the Code, to employees, including employees of any parent or subsidiary, and for the grant of nonstatutory stock options, or NSOs, stock appreciation rights, restricted stock awards, restricted stock unit awards, performance awards and other forms of awards to employees, directors and consultants, including employees and consultants of our affiliates.

Authorized Shares. Initially, the maximum number of shares of our common stock that may be issued under our 2018 Plan after it becomes effective will be shares, which is the sum of (1) new shares, plus (2) the number of shares (not to exceed shares) (i) that remain available for the issuance of awards under our 2015 Plan at the time our 2018 Plan becomes effective, and (ii) any shares subject to outstanding stock options or other stock awards that were granted under our 2015 Plan that terminate or expire

prior to exercise or settlement; are forfeited because of the failure to vest; or are reacquired or withheld (or not issued) to satisfy a tax withholding obligation or the purchase or exercise price. In addition, the number of shares of our common stock reserved for issuance under our 2018 Plan will automatically increase on January 1 of each calendar year, starting on January 1, 2019 (assuming the 2018 Plan becomes effective in 2018) through January 1, 2028, in an amount equal to % of the total number of shares of our capital stock outstanding on the last day of the calendar month before the date of each automatic increase, or a lesser number of shares determined by our board of directors. The maximum number of shares of our common stock that may be issued on the exercise of ISOs under our 2018 Plan is .

Shares subject to stock awards granted under our 2018 Plan that expire or terminate without being exercised in full or that are paid out in cash rather than in shares do not reduce the number of shares available for issuance under our 2018 Plan. If any shares of common stock issued pursuant to a stock award are forfeited back to or repurchased or reacquired by us for any reason, the shares that are forfeited or repurchased or reacquired will revert to and again become available for issuance under the 2018 Plan. Any shares reacquired in satisfaction of tax withholding obligations or as consideration for the exercise or purchase price of a stock award will again become available for issuance under the 2018 Plan.

Plan Administration. Our board of directors, or a duly authorized committee of our board of directors, will administer our 2018 Plan and is referred to as the "plan administrator" herein. Our board of directors may also delegate to one or more of our officers the authority to (1) designate employees (other than officers) to receive specified stock awards and (2) determine the number of shares subject to such stock awards. Under our 2018 Plan, our board of directors has the authority to determine award recipients, grant dates, the numbers and types of stock awards to be granted, the applicable fair market value, and the provisions of each stock award, including the period of exercisability and the vesting schedule applicable to a stock award.

Under the 2018 Plan, the board of directors also generally has the authority to effect, with the consent of any adversely affected participant, (A) the reduction of the exercise, purchase, or strike price of any outstanding award; (B) the cancellation of any outstanding award and the grant in substitution therefore of other awards, cash, or other consideration; or (C) any other action that is treated as a repricing under generally accepted accounting principles.

Stock Options. ISOs and NSOs are granted under stock option agreements adopted by the plan administrator. The plan administrator determines the exercise price for stock options, within the terms and conditions of the 2018 Plan, provided that the exercise price of a stock option generally cannot be less than 100% of the fair market value of our common stock on the date of grant. Options granted under the 2018 Plan vest at the rate specified in the stock option agreement as determined by the plan administrator.

The plan administrator determines the term of stock options granted under the 2018 Plan, up to a maximum of 10 years. Unless the terms of an optionholder's stock option agreement provide otherwise, if an optionholder's service relationship with us or any of our affiliates ceases for any reason other than disability, death, or cause, the optionholder may generally exercise any vested options for a period of three months following the cessation of service. This period may be extended in the event that exercise of the option is prohibited by applicable securities laws or our insider trading policy. If an optionholder's service relationship with us or any of our affiliates ceases due to death, or an optionholder dies within a certain period following cessation of service, the optionholder or a beneficiary may generally exercise any vested options for a period of 18 months following the date of death. If an optionholder's service relationship with us or any of our affiliates ceases due to disability, the optionholder may generally exercise any vested options for a period of 12 months following the cessation of service. In the event of a termination for cause, options generally terminate upon the termination date. In no event may an option be exercised beyond the expiration of its term.

Acceptable consideration for the purchase of common stock issued upon the exercise of a stock option will be determined by the plan administrator and may include (1) cash, check, bank draft or money order, (2) a

broker-assisted cashless exercise, (3) the tender of shares of our common stock previously owned by the optionholder, (4) a net exercise of the option if it is an NSO, or (5) other legal consideration approved by the plan administrator.

Unless the plan administrator provides otherwise, options generally are not transferable except by will or the laws of descent and distribution. Subject to approval of the plan administrator or a duly authorized officer in each case, (i) an option may be transferred pursuant to a domestic relations order, official marital settlement agreement, or other divorce or separation instrument and (ii) an optionholder may designate a beneficiary who may exercise the option following the optionholder's death.

Tax Limitations on ISOs. The aggregate fair market value, determined at the time of grant, of our common stock with respect to ISOs that are exercisable for the first time by an award holder during any calendar year under all of our stock plans may not exceed $100,000. Options or portions thereof that exceed such limit will generally be treated as NSOs. No ISO may be granted to any person who, at the time of the grant, owns or is deemed to own stock possessing more than 10% of our total combined voting power or that of any of our affiliates unless (1) the option exercise price is at least 110% of the fair market value of the stock subject to the option on the date of grant, and (2) the term of the ISO does not exceed five years from the date of grant.

Restricted Stock Unit Awards. Restricted stock unit awards are granted under restricted stock unit award agreements adopted by the plan administrator. Restricted stock unit awards may be granted in consideration for any form of legal consideration that may be acceptable to our board of directors and permissible under applicable law. A restricted stock unit award may be settled by cash, delivery of stock, a combination of cash and stock as deemed appropriate by the plan administrator, or in any other form of consideration set forth in the restricted stock unit award agreement. Additionally, dividend equivalents may be credited in respect of shares covered by a restricted stock unit award. Except as otherwise provided in the applicable award agreement, restricted stock unit awards that have not vested will be forfeited once the participant's continuous service ends for any reason.

Restricted Stock Awards. Restricted stock awards are granted under restricted stock award agreements adopted by the plan administrator. A restricted stock award may be awarded in consideration for cash, check, bank draft or money order, past or future services to us, or any other form of legal consideration that may be acceptable to our board of directors and permissible under applicable law. The plan administrator determines the terms and conditions of restricted stock awards, including vesting and forfeiture terms. If a participant's service relationship with us ends for any reason, we may receive any or all of the shares of common stock held by the participant that have not vested as of the date the participant terminates service with us through a forfeiture condition or a repurchase right.

Stock Appreciation Rights. Stock appreciation rights are granted under stock appreciation right agreements adopted by the plan administrator. The plan administrator determines the purchase price or strike price for a stock appreciation right, which generally cannot be less than 100% of the fair market value of our common stock on the date of grant. A stock appreciation right granted under the 2018 Plan vests at the rate specified in the stock appreciation right agreement as determined by the plan administrator. Stock appreciation rights may be settled in cash or shares of common stock.

The plan administrator determines the term of stock appreciation rights granted under the 2018 Plan, up to a maximum of 10 years. If a participant's service relationship with us or any of our affiliates ceases for any reason other than cause, disability, or death, the participant may generally exercise any vested stock appreciation right for a period of three months following the cessation of service. This period may be further extended in the event that exercise of the stock appreciation right following such a termination of service is prohibited by applicable securities laws or our insider trading policy. If a participant's service relationship with us, or any of our affiliates, ceases due to disability or death, or a participant dies within a certain period following cessation of service, the participant or a beneficiary may generally exercise any vested stock appreciation right for a period of 12 months in the event of disability and 18 months in the event of death. In the event of a termination for cause, stock

appreciation rights generally terminate immediately upon the occurrence of the event giving rise to the termination of the individual for cause. In no event may a stock appreciation right be exercised beyond the expiration of its term.

Performance Awards. The 2018 Plan permits the grant of performance awards that may be settled in stock, cash or other property. Performance awards may be structured so that the stock or cash will be issued or paid only following the achievement of certain pre-established performance goals during a designated performance period. Performance awards that are settled in cash or other property are not required to be valued in whole or in part by reference to, or otherwise based on, the common stock.

The performance goals may be based any measure of performance selected by the board of directors. The performance goals may be based on company-wide performance or performance of one or more business units, divisions, affiliates, or business segments, and may be either absolute or relative to the performance of one or more comparable companies or the performance of one or more relevant indices. Our board of directors is authorized at any time in its sole discretion, to adjust or modify the calculation of a performance goal for such performance period in order to prevent the dilution or enlargement of the rights of participants, (a) in the event of, or in anticipation of, any unusual or extraordinary corporate item, transaction, event or development; (b) in recognition of, or in anticipation of, any other unusual or nonrecurring events affecting us, or our consolidated financial statements in response to, or in anticipation of, changes in applicable laws, regulations, accounting principles, or business conditions; or (c) in view of the board of director's assessment of our business strategy, performance of comparable organizations, economic and business conditions, and any other circumstances deemed relevant. Unless specified otherwise by the board of directors at the time the performance award is granted, the board will appropriately make adjustments in the method of calculating the attainment of performance goals as follows: (i) to exclude restructuring and/or other nonrecurring charges; (ii) to exclude exchange rate effects; (iii) to exclude the effects of changes to generally accepted accounting principles; (iv) to exclude the effects of any statutory adjustments to corporate tax rates; (v) to exclude the effects of items that are "unusual" in nature or occur "infrequently" as determined under generally accepted accounting principles; (vi) to exclude the dilutive effects of acquisitions or joint ventures; (vii) to assume that any portion of our business which is divested achieved performance objectives at targeted levels during the balance of a performance period following such divestiture; (viii) to exclude the effect of any change in the outstanding shares of our common stock by reason of any stock dividend or split, stock repurchase, reorganization, recapitalization, merger, consolidation, spin-off, combination or exchange of shares or other similar corporate change, or any distributions to common stockholders other than regular cash dividends; (ix) to exclude the effects of stock based compensation and the award of bonuses under our bonus plans; (x) to exclude costs incurred in connection with potential acquisitions or divestitures that are required to be expensed under generally accepted accounting principles; and (xi) to exclude the goodwill and intangible asset impairment charges that are required to be recorded under generally accepted accounting principles.

Other Stock Awards. The plan administrator may grant other awards based in whole or in part by reference to our common stock. The plan administrator will set the number of shares under the stock award (or cash equivalent) and all other terms and conditions of such awards.

Changes to Capital Structure. In the event there is a specified type of change in our capital structure, such as a stock split, reverse stock split, or recapitalization, appropriate adjustments will be made to (1) the class and maximum number of shares reserved for issuance under the 2018 Plan, (2) the class and maximum number of shares by which the share reserve may increase automatically each year, (3) the class and maximum number of shares that may be issued on the exercise of ISOs, and (4) the class and number of shares and exercise price, strike price, or purchase price, if applicable, of all outstanding stock awards.

Corporate Transactions. Our 2018 Plan provides that in the event of certain specified significant corporate transactions (or a change in control, as defined below), unless otherwise provided in an award agreement or other

written agreement between us and the award holder, the plan administrator may take one or more of the following actions with respect to such stock awards:

- arrange for the assumption, continuation, or substitution of a stock award by a successor corporation;
- arrange for the assignment of any reacquisition or repurchase rights held by us to a successor corporation;
- accelerate the vesting, in whole or in part, of the stock award and provide for its termination if not exercised (if applicable) at or before the effective time of the transaction;
- arrange for the lapse, in whole or in part, of any reacquisition or repurchase rights held by us;
- cancel or arrange for the cancellation of the stock award, to the extent not vested or not exercised before the effective time of the transaction, in exchange for a cash payment, if any; or
- make a payment equal to the excess, if any, of (A) the value of the property the participant would have received on exercise of the award immediately before the effective time of the transaction, over (B) any exercise price payable by the participant in connection with the exercise.

The plan administrator is not obligated to treat all stock awards or portions of stock awards in the same manner and is not obligated to take the same actions with respect to all participants.

Under the 2018 Plan, a corporate transaction is generally the consummation of: (1) a sale of all or substantially all of our assets, (2) the sale or disposition of more than 50% of our outstanding securities, (3) a merger or consolidation where we do not survive the transaction, or (4) a merger or consolidation where we do survive the transaction but the shares of our common stock outstanding immediately before such transaction are converted or exchanged into other property by virtue of the transaction.

Change in Control. In the event of a change in control, the plan administrator may take any of the above-mentioned actions. Awards granted under the 2018 Plan may be subject to additional acceleration of vesting and exercisability upon or after a change in control as may be provided in the applicable stock award agreement or in any other written agreement between us or any affiliate and the participant, but in the absence of such provision, no such acceleration will automatically occur. Under the 2018 Plan, a change in control is generally (1) the acquisition by any person or company of more than 50% of the combined voting power of our then outstanding stock, (2) a merger, consolidation or similar transaction in which our stockholders immediately before the transaction do not own, directly or indirectly, more than 50% of the combined voting power of the surviving entity (or the parent of the surviving entity) in substantially the same proportions as their ownership immediately prior to such transaction, (3) a sale, lease, exclusive license or other disposition of all or substantially all of our assets other than to an entity more than 50% of the combined voting power of which is owned by our stockholders in substantially the same proportions as their ownership of our outstanding voting securities immediately prior to such transaction, (4) a complete dissolution or liquidation of the company, or (5) when a majority of our board of directors becomes comprised of individuals who were not serving on our board of directors on the date of the underwriting agreement related to this offering, or the incumbent board, or whose nomination, appointment, or election was not approved by a majority of the incumbent board still in office.

Plan Amendment or Termination. Our board of directors has the authority to amend, suspend, or terminate our 2018 Plan, provided that such action does not materially impair the existing rights of any participant without such participant's written consent. Certain material amendments also require the approval of our stockholders. No ISOs may be granted after the tenth anniversary of the date our board of directors adopts our 2018 Plan. No stock awards may be granted under our 2018 Plan while it is suspended or after it is terminated.

2015 Equity Incentive Plan

Our board of directors adopted our 2015 Plan in February 2015, and our stockholders approved our 2015 Plan in May 2015. Our 2015 Plan was most recently amended by our board of directors and stockholders in

October 2018. As of September 30, 2018, there were 168,760 shares remaining available for the future grant of stock awards under our 2015 Plan. As of September 30, 2018, there were outstanding stock options covering a total of 2,468,240 shares of our common stock that were granted under our 2015 Plan. We expect that any shares remaining available for issuance under the 2015 Plan will become available for issuance under the 2018 Plan in connection with this offering.

Stock Awards. Our 2015 Plan provides for the grant of ISOs within the meaning of Section 422 of the Code to employees, including employees of any parent or subsidiary, and for the grant of NSOs, stock appreciation rights, restricted stock awards and restricted stock units awards to employees, directors and consultants, including employees and consultants of our affiliates. To date, we have only granted stock options under the 2015 Plan.

Authorized Shares. Subject to certain capitalization adjustments, the aggregate number of shares of common stock that may be issued pursuant to stock awards under the 2015 Plan will not exceed 7,454,710 shares. The maximum number of shares of our common stock that may be issued pursuant to the exercise of ISOs under our 2015 Plan is 7,454,710 shares.

Shares subject to stock awards granted under our 2015 Plan that expire or otherwise terminate without being exercised in full or that are settled in cash rather than in shares do not reduce or otherwise offset the number of shares available for issuance under our 2015 Plan. Additionally, if any shares issued pursuant to a stock award are forfeited back to or repurchased because of the failure to meet a contingency or condition required to vest, then the shares that are forfeited or repurchased will revert to and again become available for issuance under the 2015 Plan. This includes shares used to pay the exercise price of a stock award or to satisfy the tax withholding obligations related to a stock award.

Plan Administration. Our board of directors, or a duly authorized committee of our board of directors to which the board delegates its administrative authority, will administer our 2015 Plan and is referred to as the "plan administrator" herein. The plan administrator may also delegate to one or more of our officers the authority to (1) designate employees (including officers) to receive specified options and stock appreciation rights (and to the extent permitted by applicable law, other stock awards) and (2) determine the number of shares subject to such stock awards; provided, however, that the board resolutions regarding such delegation must specify the total number of shares that may be subject to awards granted by such officer, and provided further, that no officer may grant an award under the 2015 Plan to himself or herself. Under our 2015 Plan, the plan administrator has the authority to, among other things, determine award recipients, dates of grant, the numbers and types of stock awards to be granted, the applicable fair market value and the provisions of each stock award, including the period of their exercisability and the vesting schedule applicable to a stock award, to construe and interpret the 2015 Plan and awards granted thereunder (and to establish, amend and revoke any rules and regulations for the administration of the 2015 Plan), and to accelerate awards.

Under the 2015 Plan, the plan administrator also generally has the authority to effect, with the consent of any adversely affected participant, (A) the reduction of the exercise or strike price of any outstanding option or stock appreciation right; (B) the cancellation of any outstanding option or stock appreciation right and the grant in substitution therefore of other awards, cash, or other consideration; or (C) any other action that is treated as a repricing under generally accepted accounting principles.

Stock Options. ISOs and NSOs are granted under stock option agreements adopted by the plan administrator. The plan administrator determines the exercise price for stock options, within the terms and conditions of the 2015 Plan, provided that the exercise price of a stock option generally cannot be less than 100% of the fair market value of our common stock on the date of grant (or 110% of the fair market value for certain major stockholders). Options granted under the 2015 Plan vest at the rate specified in the stock option agreement as determined by the plan administrator.

The plan administrator determines the term of stock options granted under the 2015 Plan, up to a maximum of 10 years (or five years, for certain major stockholders). If an optionholder's service relationship with us or any of our affiliates ceases for any reason other than disability, death or cause, the optionholder may generally exercise any vested options for a period of up to three months following the cessation of service. This period may be extended in the event that exercise of the option is prohibited by applicable securities laws or our insider trading policy.

If an optionholder's service relationship with us or any of our affiliates ceases due to death, or an optionholder dies within a certain period following cessation of service, the optionholder or a beneficiary may generally exercise any vested options for a period of up to 18 months following the date of death. If an optionholder's service relationship with us or any of our affiliates ceases due to disability, the optionholder may generally exercise any vested options for a period of up to 12 months following the cessation of service. In the event of a termination for cause, options generally terminate upon the termination date. In no event may an option be exercised beyond the expiration of its term.

Acceptable consideration for the purchase of common stock issued upon the exercise of a stock option will be determined by the plan administrator and may include (1) cash, check, bank draft or money order payable to us, (2) a broker-assisted cashless exercise, (3) the tender of shares of our common stock previously owned by the optionholder, (4) a net exercise of the option if it is an NSO, (5) a deferred payment arrangement, or (6) other legal consideration approved by the plan administrator.

Unless the plan administrator provides otherwise, options generally are not transferable except by will or the laws of descent and distribution. Subject to approval of the plan administrator or a duly authorized designee in each case, (i) an option may be transferred pursuant to a domestic relations order and (ii) an optionholder may designate a beneficiary who may exercise the option following the optionholder's death.

Tax Limitations on ISOs. The aggregate fair market value, determined at the time of grant, of our common stock with respect to ISOs that are exercisable for the first time by an optionholder during any calendar year under all of our stock plans may not exceed $100,000. Options or portions thereof that exceed such limit will generally be treated as NSOs. No ISO may be granted to any person who, at the time of the grant, owns or is deemed to own stock possessing more than 10% of our total combined voting power or that of any of our affiliates unless (1) the option exercise price is at least 110% of the fair market value of the stock subject to the option on the date of grant, and (2) the term of the ISO does not exceed five years from the date of grant.

Restricted Stock Unit Awards. Restricted stock unit awards are granted under restricted stock unit award agreements adopted by the plan administrator. Restricted stock unit awards may be granted in consideration for any form of legal consideration that may be acceptable to our board of directors and permissible under applicable law. A restricted stock unit awards may be settled by cash, delivery of stock, a combination of cash and stock as deemed appropriate by the plan administrator, or in any other form of consideration set forth in the restricted stock unit award agreement. Additionally, dividend equivalents may be credited in respect of shares covered by a restricted stock unit award. Except as otherwise provided in the applicable award agreement, restricted stock unit awards that have not vested will be forfeited once the participant's continuous service ends for any reason.

Restricted Stock Awards. Restricted stock awards are granted under restricted stock award agreements adopted by the plan administrator. A restricted stock award may be awarded in consideration for cash or cash equivalents, past or future services to us, or any other form of legal consideration that may be acceptable to our board of directors and permissible under applicable law. The plan administrator determines the terms and conditions of restricted stock awards, including vesting and forfeiture terms. If a participant's service relationship with us ends for any reason, we may receive any or all of the shares of common stock held by the participant that have not vested as of the date the participant terminates service with us through a forfeiture condition or a repurchase right.

Changes to Capital Structure. In the event of a capitalization adjustment, the board of directors, in its discretion, will make appropriate and proportionate adjustments to (1) the class and maximum number of shares reserved for issuance under the 2015 Plan, (2) the class and maximum number of shares that may be issued on the exercise of ISOs, and (3) the class and number of shares and exercise price, strike price, or purchase price, if applicable, of all outstanding stock awards. For purposes of the 2015 Plan, capitalization adjustment generally means any change that is made in (or other events occurring with respect to) our common stock subject to the 2015 Plan or any award without the receipt of consideration by us through merger, consolidation, reorganization, recapitalization, reincorporation, stock dividend, dividend in property other than cash, large non-recurring cash dividend, stock split, reverse stock split, liquidating dividend, combination or exchange of shares, change in corporate structure, or other similar equity restructuring transaction (within the meaning of Financial Accounting Standards Board ASC Topic 718).

Corporate Transactions. Our 2015 Plan provides that in the event of a corporate transaction, unless otherwise provided in an award agreement or other written agreement between us and the award holder, the plan administrator may take one or more of the following actions with respect to such stock awards:

- arrange for the assumption, continuation, or substitution of a stock award by a surviving or acquiring corporation;
- arrange for the assignment of any reacquisition or repurchase rights held by us to the surviving or acquiring corporation;
- accelerate the vesting, in whole or in part, of the stock award and provide for its termination if not exercised (if applicable) at or before the effective time of the transaction;
- arrange for the lapse of any reacquisition or repurchase rights held by us with respect to the stock award;
- cancel or arrange for the cancellation of the stock award, to the extent not vested or exercised before the effective time of the transaction, in exchange for such cash consideration, if any, as the board of directors may consider appropriate; and
- make a payment equal to the excess, if any, of (A) the value of the property the participant would have received on exercise of the award, over (B) any exercise price payable by the participant in connection with the exercise.

The plan administrator is not obligated to treat all stock awards in the same manner and is not obligated to treat all participants in the same manner.

Under the 2015 Plan, a corporate transaction is generally defined as the consummation, in a single transaction or in a series of related transactions, of: (1) a sale or other disposition of all or substantially all of our assets, (2) the sale or disposition of at least 50% of our outstanding securities, (3) a merger or consolidation where we do not survive the transaction, or (4) a merger, consolidation or similar transaction where we do survive the transaction but the shares of our common stock outstanding immediately before such transaction are converted or exchanged into other property by virtue of the transaction.

Change in Control. A stock award may be subject to additional acceleration of vesting and exercisability upon or after a change in control as may be provided in an applicable award agreement or other written agreement, but in the absence of such provision, no such acceleration will occur. Under the 2015 Plan, a change in control is generally defined as (1) the acquisition by a person or entity of more than 50% of the combined voting power of our then outstanding stock other than by merger, consolidation or similar transaction, (2) a consummated merger, consolidation or similar transaction in which our stockholders immediately before the transaction do not own, directly or indirectly, more than 50% of the combined voting power of the surviving entity (or the parent of the surviving entity) in substantially the same proportions as their ownership immediately prior to such transaction, or (3) a consummated sale, lease, exclusive license or other disposition of all or substantially all of our consolidated assets other than to an entity more than 50% of the combined voting power

of which is owned by our stockholders in substantially the same proportions as their ownership of our outstanding voting securities immediately prior to such transaction.

Plan Amendment or Termination. Our board of directors has the authority to amend, suspend, or terminate our 2015 Plan, provided that such action does not impair the existing rights of any participant without such participant's written consent. Certain material amendments also require the approval of our stockholders. Unless terminated sooner, the 2015 Plan will automatically terminate on February 4, 2025. No stock awards may be granted under our 2015 Plan while it is suspended or after it is terminated.

2018 Employee Stock Purchase Plan

Our board of directors adopted, and our stockholders approved, our ESPP in 2018. The ESPP will become effective immediately prior to and contingent upon the date of the underwriting agreement related to this offering. The purpose of the ESPP is to secure the services of new employees, to retain the services of existing employees, and to provide incentives for such individuals to exert maximum efforts toward our success and that of our affiliates. The ESPP is intended to qualify as an "employee stock purchase plan" within the meaning of Section 423 of the Code for U.S. employees.

Share Reserve. Following this offering, the ESPP authorizes the issuance of shares of our common stock under purchase rights granted to our employees or to employees of any of our designated affiliates. The number of shares of our common stock reserved for issuance will automatically increase on January 1 of each calendar year, beginning on January 1, 2019 (assuming the ESPP becomes effective in 2018) through January 1, 2028, by the lesser of (1) % of the total number of shares of our common stock outstanding on the last day of the calendar month before the date of the automatic increase, and (2) shares; provided that before the date of any such increase, our board of directors may determine that such increase will be less than the amount set forth in clauses (1) and (2). As of the date hereof, no shares of our common stock have been purchased under the ESPP.

Administration. Our board of directors administers the ESPP and may delegate its authority to administer the ESPP to our compensation committee. The ESPP is implemented through a series of offerings under which eligible employees are granted purchase rights to purchase shares of our common stock on specified dates during such offerings. Under the ESPP, we may specify offerings with durations of not more than months, and may specify shorter purchase periods within each offering. Each offering will have one or more purchase dates on which shares of our common stock will be purchased for employees participating in the offering. An offering under the ESPP may be terminated under certain circumstances.

Payroll Deductions. Generally, all regular employees, including executive officers, employed by us or by any of our designated affiliates, may participate in the ESPP and may contribute, normally through payroll deductions, up to % of their earnings (as defined in the ESPP) for the purchase of our common stock under the ESPP. Unless otherwise determined by our board of directors, common stock will be purchased for the accounts of employees participating in the ESPP at a price per share that is at least the lesser of (1) 85% of the fair market value of a share of our common stock on the first date of an offering, or (2) 85% of the fair market value of a share of our common stock on the date of purchase.

Limitations. Employees may have to satisfy one or more of the following service requirements before participating in the ESPP, as determined by our board of directors, including: (1) being customarily employed for more than 20 hours per week, (2) being customarily employed for more than five months per calendar year, or (3) continuous employment with us or one of our affiliates for a period of time (not to exceed two years). No employee may purchase shares under the ESPP at a rate in excess of $25,000 worth of our common stock based on the fair market value per share of our common stock at the beginning of an offering for each calendar year such a purchase right is outstanding. Finally, no employee will be eligible for the grant of any purchase rights under the ESPP if immediately after such rights are granted, such employee has voting power over 5% or more of our outstanding capital stock measured by vote or value under Section 424(d) of the Code.

Changes to Capital Structure. In the event that there occurs a change in our capital structure through such actions as a stock split, merger, consolidation, reorganization, recapitalization, reincorporation, stock dividend, dividend in property other than cash, large nonrecurring cash dividend, liquidating dividend, combination of shares, exchange of shares, change in corporate structure, or similar transaction, the board of directors will make appropriate adjustments to: (1) the class(es) and maximum number of shares reserved under the ESPP, (2) the class(es) and maximum number of shares by which the share reserve may increase automatically each year, (3) the class(es) and number of shares subject to and purchase price applicable to outstanding offerings and purchase rights, and (4) the class(es) and number of shares that are subject to purchase limits under ongoing offerings.

Corporate Transactions. In the event of certain significant corporate transactions, any then-outstanding rights to purchase our stock under the ESPP may be assumed, continued, or substituted for by any surviving or acquiring entity (or its parent company). If the surviving or acquiring entity (or its parent company) elects not to assume, continue, or substitute for such purchase rights, then the participants' accumulated payroll contributions will be used to purchase shares of our common stock within 10 business days before such corporate transaction, and such purchase rights will terminate immediately.

Under the ESPP, a corporate transaction is generally the consummation of: (1) a sale of all or substantially all of our assets, (2) the sale or disposition of more than 50% of our outstanding securities, (3) a merger or consolidation where we do not survive the transaction, and (4) a merger or consolidation where we do survive the transaction but the shares of our common stock outstanding immediately before such transaction are converted or exchanged into other property by virtue of the transaction.

ESPP Amendment or Termination. Our board of directors has the authority to amend or terminate our ESPP, provided that except in certain circumstances such amendment or termination may not materially impair any outstanding purchase rights without the holder's consent. We will obtain stockholder approval of any amendment to our ESPP as required by applicable law or listing requirements.

Director Compensation

The following table sets forth in summary form information concerning the compensation that we paid or awarded during the year ended December 31, 2017 to each of our non-employee directors:

Name(1)	Fees Earned or Paid in Cash ($)	Total ($)
Lars Ekman(2)	57,750	57,750
Kelly Martin	—	—
Adrian Howd	—	—
Robert Lyons	—	—

(1) As of December 31, 2017, the aggregate number of shares outstanding under all options to purchase our common stock held by our non-employee directors were: Dr. Ekman, 58,829. None of our other non-employee directors held outstanding options as of December 31, 2017. None of our non-employee directors held unvested stock awards (other than options) as of December 31, 2017.

(2) The cash fees were paid to Dr. Ekman in consideration of his services provided as director and chairman. Dr. Ekman resigned from our board of directors effective October 6, 2017, and has remained a consultant to us.

We have reimbursed and will continue to reimburse all of our non-employee directors for their reasonable out-of-pocket costs and expenses incurred in connection with attending board meetings.

In July 2018, we entered into a board services agreement with John Schmid, pursuant to which Mr. Schmid is entitled to an annual cash retainer of $45,000 for his services as a member of the board of directors and

chairperson of the audit committee. In July 2018, pursuant to the agreement, we granted Mr. Schmid a stock option to purchase 40,000 shares of common stock. The option has an exercise price of $9.62 per share and vests as follows: 12.5% of the shares subject to the option vest on the six-month anniversary of the vesting commencement date, and the remaining shares vest in 42 equal monthly installments thereafter, subject to Mr. Schmid remaining in service with us as of each vesting date.

We expect to adopt a non-employee director compensation policy, pursuant to which our non-employee directors will be eligible to receive compensation for service on our board of directors and committees of our board of directors.

CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

The following is a description of transactions since January 1, 2015 to which we have been a party in which the amount involved exceeded $120,000 and in which any of our executive officers, directors or beneficial holders of more than 5% of our capital stock had or will have a direct or indirect material interest, other than compensation arrangements which are described in the section titled “Executive and Director Compensation.”

Relationship with Transposagen and Hera

We were formed in December 2014 in connection with the restructuring of Transposagen completed in February 2015, which we refer to as the Spin Out. In connection with the Spin Out, Transposagen split its business among Poseida, Hera Testing Laboratories, Inc., or Hera, and Transposagen. Dr. Ostertag, our Chief Executive Officer and a member of our board of directors, is a member of the board of directors of Transposagen, served as its Chief Executive Officer from its inception until July 2015 and together with his affiliated entities, owns 9,341,488 shares of its common stock and holds options to purchase 98,520 shares of its common stock, such that on a fully-diluted basis, Dr. Ostertag owns 69.3% of its capital stock. Dr. Ostertag is also a member of the board of directors of Hera and served as its Chief Executive Officer from inception until July 2015, and together with his affiliated entities, owns 9,341,488 shares of its common stock, 1,066,330 shares of its Series A preferred stock, 138,228 shares of its Series A-2 preferred stock, warrants to purchase 13,823 shares of common stock and options to purchase 113,520 shares of its common stock, such that on a fully-diluted basis, Dr. Ostertag owns 45.5% of its capital stock. In connection with the Spin Out, we entered into several agreements with each of Transposagen and Hera providing for, among other things, the transfer to us of all Transposagen’s assets and platform technologies with therapeutic applications, a license to Transposagen of all such intellectual property in the fields of bioprocessing, agricultural and industrial purposes, and the use, manufacture, and sale reagents, cell lines, and animal models and to offer related services, and a license to Hera of all such intellectual property in the fields of toxicology testing, genetic testing and reference standards. The material terms of these agreements are summarized below.

Asset Contribution Agreement

In connection with the Spin Out, we and Transposagen entered into an asset contribution agreement, or the Asset Contribution Agreement, that described the assets and liabilities that remained with or were transferred to us and those that remained with Transposagen. In consideration of this transfer, we issued 12,035,811 shares of our common stock to Transposagen, which then distributed the shares to its stockholders, on a pro rata basis. As required under the Asset Contribution Agreement, we also issued options to purchase an aggregate of 404,710 shares of our common stock, with an exercise price of $0.2195 per share, which we refer to collectively as the Spin Out Options, to the holders of Transposagen’s stock options. Each holder of Transposagen’s stock options received a Spin Out Option to purchase the same number of shares of our common stock as the corresponding Transposagen stock option held by such holder at such time and each Spin Out Option has the same expiration date and vesting schedule as the corresponding Transposagen stock option. As a result of his ownership of Transposagen’s capital stock and stock options prior to the Spin Out, Dr. Ostertag, and entities affiliated with Dr. Ostertag, received an aggregate of 9,341,488 shares of our common stock and Spin Out Options exercisable for 38,520 shares of our common stock at an exercise price of $0.2195 per share.

Under the Asset Contribution Agreement, we and Transposagen each agreed to indemnify and hold harmless the other party and its affiliates (including Dr. Ostertag), or certain subsidiaries, as applicable, and each of their respective permitted successors and assigns, from any and all losses arising out of or in connection with, among other things, our business and certain additional specified liabilities or Transposagen’s business and certain additional specified liabilities, as applicable.

Transposagen License Agreements

Patent License Agreements. In February 2015, we entered into two patent license agreements with Transposagen that were amended and restated effective as of September 2018 into three patent license

agreements, or the Patent License Agreements. The Patent License Agreements granted Transposagen a perpetual, irrevocable, fully paid, royalty-free, exclusive, sublicenseable (through multiple tiers, subject to certain restrictions), worldwide license under certain of our patents, with each agreement covering a different defined field of use: (a) bioprocessing, (b) agricultural and industrial purposes, and (c) the use, manufacture, and sale of reagents, cell lines, and animal models and to offer related services, in each case, expressly excluding exploitation of the licensed patents for any product that comprises or contains any cell or biological material that contains or has been modified by any technology claimed in the licensed patents for the prevention, treatment, or palliation of any and all diseases and conditions in humans. We also received a transferable, irrevocable, fully paid, royalty-free, exclusive, sublicensable (through multiple tiers), worldwide license from Transposagen under certain of Transposagen's patents for our practice of engineering cell- and gene-based therapeutics. Under each of the Patent License Agreements, each party agreed to indemnify the other against third party claims arising from breach of the agreement by the indemnifying party and for the negligence or willful misconduct of the indemnifying party. Additionally, Transposagen agreed to indemnify us for claims arising from Transposagen's exploitation of products by or on behalf of Transposagen, its affiliates, or its or their sublicensees. Each of the Patent License Agreements continues until expiration of the last valid claim contained in any of the patents licensed thereunder.

Trademark Licenses. In February 2015, we entered into two trademark license agreements with Transposagen that were amended in September 2018, or the Transposagen Trademark License Agreements. Under the Transposagen Trademark License Agreements, we granted Transposagen an exclusive, perpetual, royalty-free, exclusive, transferrable, sublicenseable (through multiple tiers), right and license to use certain of our trademarks in connection with Transposagen's practice of the patents licensed to it under the Patent License Agreements. One of the Transposagen Trademark License Agreements covers agricultural uses and the other Transposagen Trademark License Agreement covers reagents, cellular engineering and animal models. The Transposagen Trademark License Agreements include certain restrictions on Transposagen's use of the trademarks to protect the associated goodwill. Either party can terminate each Transposagen Trademark License Agreement upon written notice in the event of the uncured material breach by the other party. We also have the right to terminate each Transposagen Trademark License Agreement in the event of the sustained closure of Transposagen's business operations.

Transposagen Master Services Agreement

In February 2015, we entered into a master services agreement with Transposagen, or the Master Services Agreement. Pursuant to the terms of the Master Services Agreement, Transposagen was obligated to provide us with services as specified by us in one or more written work orders, subject to acceptance by Transposagen. We own all intellectual property or know-how made or developed by Transposagen in the course of performing the services or otherwise under the Master Services, including all deliverables. We and Transposagen also each agreed to indemnify, defend and hold harmless the other party and its affiliates and their respective directors, officers, employees and agents, from any and all losses arising out of or resulting from any third party claims to the extent arising from the negligence, recklessness or willful misconduct of the indemnifying party or any of its officers, directors, employees, or agents or breach of the Agreement by the indemnifying party. We terminated the Master Services Agreement in January 2019. Prior to the termination, we paid Transposagen aggregate fees of $0.2 million under the Master Services Agreement.

Hera License Agreements

Technology License Agreement. In February 2015, we entered into a technology license agreement with Hera, or the Technology License Agreement. Under the Technology License Agreement, we granted Hera a transferable, irrevocable, fully paid, royalty-free, exclusive, sublicenseable (through multiple tiers), worldwide license under certain of our patents and technology in the field of in vivo or in vitro toxicology, including the use of genetically modified animal models or cell lines for toxicology, genetic testing and reference standard uses, or the Hera Field. We also granted Hera a non-exclusive, sublicenseable (through multiple tiers), worldwide license

under certain of our patents and technology in the fields of reagents, cellular engineering and animal model products and services, solely as necessary to develop products and services for the Hera Field. The fields of use licensed to Hera expressly excludes all products and services that directly or indirectly relate to the prevention, treatment or palliation of any and all diseases and conditions in humans and the manufacture of any such products and services. Hera granted us a transferable, irrevocable, fully paid, royalty-free, exclusive, sublicenseable (through multiple tiers), worldwide license under certain of Hera's patents and technology in all fields of use other than the Hera Field. Each party has the sole right to prosecute, maintain and enforce its licensed patents, and Hera agreed to reimburse a reasonable portion of the filing, prosecution and maintenance costs incurred by us related to our patents licensed to Hera under the Technology License Agreement.

Trademark License Agreement. In February 2015, we entered into a trademark license agreement with Hera, or the Hera Trademark License Agreement, under which we granted Hera an exclusive, perpetual, royalty-free, exclusive, transferrable, sublicenseable (through multiple tiers), right and license to use certain of our trademarks in connection Hera's practice of the patent rights licensed to it under the Technology License Agreement. The Hera Trademark License Agreement includes certain restrictions on Hera's use of our trademarks to protect the associated goodwill. Either party can terminate the Hera Trademark License Agreement upon written notice in the event of an uncured material breach of the other party. We may also terminate the Hera Trademark License Agreement immediately in the event of the sustained closure of Hera's business operations or if Hera makes an assignment for the benefit of creditors, files for bankruptcy or reorganization, is placed in the hands of a receiver, or has an involuntary bankruptcy petition against it that has not been dismissed, vacated, or stayed within a certain time period.

Acquisition of Vindico

In October 2016, we acquired Vindico NanoBioTechnology LLC (formerly known as Vindico NanoBioTechnology, Inc.), or Vindico, pursuant to an agreement and plan of merger and reorganization among us, Vindico and the parties thereto, or the Vindico Merger Agreement. Dr. Ostertag served as Vindico's President and Chief Executive Officer from its inception until July 2015 and as member of its board of directors until it was acquired by us. Under the Vindico Merger Agreement, we paid an aggregate of $1,050,000 to the former Vindico stockholders, subject to certain deductions, and issued an aggregate of 437,115 shares of our common stock to the former stockholders of Vindico. We also agreed to use good faith reasonable efforts to achieve a scientific development milestone during the 24 month period after the closing of our acquisition of Vindico, or the milestone period. If the milestone was achieved during the milestone period, we would be required to pay the former stockholders of Vindico $11,000,000, with the form of payment varying based upon whether a preferred stock financing and/or a liquidity event occurred prior to end of the milestone period. In July 2018, we entered into an amendment to the Vindico Merger Agreement in which we agreed to use good faith reasonable efforts to achieve the milestone by July 31, 2019, with the amount of the milestone payment varying based on whether the milestone was achieved on or before October 10, 2018 and prior to a preferred stock financing and/or a liquidity event. The milestone was not achieved by October 10, 2018. As a result, if the milestone is achieved by July 31, 2019, we will be obligated to issue the former stockholders of Vindico up to an aggregate of 1,893,287 shares of our common stock if we do not consummate an equity financing with total proceeds of not less than $20,000,000 prior to this offering, or such number of shares of our common stock equal to $11,000,000 divided by the price per share in such equity financing, or, if a liquidation event occurs before the achievement of the milestone and the milestone is subsequently achieved by July 31, 2019, we may elect to satisfy the milestone payment in cash, shares of our common stock, or a combination of cash and common stock. As a result of his former ownership of Vindico's capital stock, Dr. Ostertag received $579,674 and 179,461 shares of our common stock in connection with the closing of the acquisition and would be entitled to receive up to 41.0% of the total compensation received by former stockholders of Vindico if the milestone is achieved.

Preferred Stock Financings

From December 2015 through March 2016, we issued and sold to investors across multiple closings an aggregate of 9,696,798 shares of our Series A preferred stock at a purchase price of $3.43 per share, for

aggregate consideration of $33.3 million, including the conversion of certain convertible promissory notes. In July 2017, we issued and sold to investors an aggregate of 3,253,645 shares of our Series A-1 preferred stock at a purchase price of $3.43 per share, for aggregate consideration of $11.2 million. In March 2018, we issued and sold to investors across two closings an aggregate of 5,249,568 shares of our Series B preferred stock at a purchase price of $5.81 per share, for aggregate consideration of $30.5 million.

The participants in the preferred stock financings included the following executive officers and members of our board of directors and holders of more than 5% of our capital stock or entities affiliated with them. The following table sets forth the aggregate number of shares of preferred stock issued to these related parties in the preferred stock financings:

Participants	Shares of Series A Preferred Stock	Shares of Series A-1 Preferred Stock	Shares of Series B Preferred Stock	Total Purchase Price
Longitude Venture Partners III, L.P.(1)	—	—	2,581,755	$14,999,997
Malin Life Sciences Holdings Limited(2)	8,746,356	1,457,725	860,585	$39,999,997
Transposagen Biopharmaceuticals, Inc.(3)	—	437,318	—	$ 1,500,001
Twin Prime Investments, LLC(4)	319,039	—	—	$ 1,000,000

(1) Dr. Hirsch, a member of our board of directors, is a member of Longitude Capital Partners III, LLC, the general partner of Longitude Venture Partners III, L.P.
(2) Mr. Murphy, a member of our board of directors, currently serves as a member of the leadership team at Malin Corporation plc, the ultimate parent company of Malin Life Sciences Holdings Limited.
(3) Dr. Ostertag was the founder and Chief Executive Officer of Transposagen and is currently a member of the board of directors and majority stockholder of Transposagen.
(4) Consists of 319,039 shares of Series A preferred stock issued to Twin Prime Investments, LLC upon conversion of a convertible promissory note in the aggregate principal amount of $1.0 million which converted at a five percent discount to the Series A preferred stock share price. Twin Prime Investments, LLC is wholly owned by Dr. Ostertag.

Investor Agreements

In connection with our preferred stock financings, we entered into an amended and restated investor rights agreement, amended and restated voting agreement and amended and restated right of first refusal and co-sale agreement containing voting rights, information rights, rights of first refusal and co-sale and registration rights, among other things, with certain of our stockholders. These rights will terminate upon the completion of this offering, except for the registration rights as more fully described in the section titled “Description of Capital Stock—Registration Rights.”

Management Rights Letters

In connection with our sale of our preferred stock, we entered into management rights letters with certain purchasers of our preferred stock, including holders of more than 5% of our capital stock and entities with which certain of our directors are affiliated, pursuant to which such entities were granted certain management rights, including the right to consult with and advise our management on significant business issues, review our operating plans, examine our books and records and inspect our facilities. These management rights will terminate upon the completion of this offering.

Indemnification Agreements

Our amended and restated certificate of incorporation, which will be effective upon the completion of this offering, will contain provisions limiting the liability of directors, and our amended and restated bylaws, which will be effective upon the completion of this offering, will provide that we will indemnify each of our directors to the fullest extent permitted under Delaware law. Our amended and restated certificate of incorporation and amended and restated bylaws will also provide our board of directors with discretion to indemnify our officers and employees when determined appropriate by our board of directors.

We intend to enter into indemnification agreements with each of our directors and executive officers and certain other employees. The indemnification agreements will provide that we will indemnify each of our directors, executive officers and such other employees against any and all expenses incurred by that director, executive officer or other employee because of his or her status as one of our directors, executive officers or other employees, to the fullest extent permitted by Delaware law, our amended and restated certificate of incorporation and our amended and restated bylaws. In addition, the indemnification agreements will provide that, to the fullest extent permitted by Delaware law, we will advance all expenses incurred by our directors, executive officers and other employees in connection with a legal proceeding involving his or her status as a director, executive officer or employee.

Policies and Procedures for Related Party Transactions

Our audit committee has the primary responsibility for the review, approval and oversight of any "related party transaction," which is any transaction, arrangement or relationship (or series of similar transactions, arrangements, or relationships) in which we are, were or will be a participant and the amount involved exceeds $120,000, and in which the related person has, had or will have a direct or indirect material interest. We intend to adopt a written related party transaction policy to be effective upon the completion of this offering. Under our related party transaction policy, our management will be required to submit any related person transaction not previously approved or ratified by our audit committee to our audit committee. In approving or rejecting the proposed transactions, our audit committee will take into account all of the relevant facts and circumstances available.

PRINCIPAL STOCKHOLDERS

The following table sets forth certain information with respect to the beneficial ownership of our common stock as of September 30, 2018, and as adjusted to reflect the sale of common stock offered by us in this offering, for:

- each of our named executive officers;
- each of our directors;
- all of our executive officers and directors as a group; and
- each stockholder known by us to be the beneficial owner of more than 5% of our outstanding shares of common stock.

We have determined beneficial ownership in accordance with the rules of the SEC. Except as indicated in the footnotes below, we believe, based on the information furnished to us, that the persons and entities named in the table below have sole voting and investment power with respect to all shares of common stock that they beneficially own, subject to applicable community property laws.

Applicable percentage ownership is based on 33,490,647 shares of common stock outstanding at September 30, 2018, after giving effect to the conversion of all outstanding shares of preferred stock as of that date into an aggregate of 18,200,011 shares of our common stock. For purposes of computing percentage ownership after this offering, we have assumed that (i) shares of common stock will be issued by us in this offering; (ii) the underwriters will not exercise their option to purchase additional shares and (iii) none of our executive officers, directors or stockholders who beneficially own more than five percent of our common stock will participate in this offering. In computing the number of shares of common stock beneficially owned by a person or entity and the percentage ownership of that person or entity, we deemed to be outstanding all shares of common stock subject to options held by that person or entity that are currently exercisable or that will become exercisable within 60 days of September 30, 2018. We did not deem these shares outstanding, however, such shares were included for the purpose of computing the percentage ownership of any other person or entity. Unless otherwise indicated, the address of each beneficial owner listed in the table below is c/o Poseida Therapeutics, Inc., 4242 Campus Point Court, Suite 700, San Diego, CA 92121.

Name and Address of Beneficial Owner	Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned	
		Before Offering	After Offering
Greater than 5% Stockholders			
Malin Life Sciences Holdings Limited(1)	11,064,666	33.0%	%
Eric Ostertag Living Trust dated March 30, 2016(2)	4,953,355	14.8%	%
Titan LLC(3)	4,545,454	13.6%	%
Longitude Venture Partners III, L.P.(4)	2,581,755	7.7%	%
Directors and Named Executive Officers			
Eric Ostertag, M.D., Ph.D.(5)	12,020,832	35.7%	%
Matthew A. Spear, M.D.(6)	108,750	*	%
Nishan de Silva, M.D.(7)	876,914	2.6%	%
David Hirsch, M.D., Ph.D.(8)	2,581,755	7.7%	%
Sean Murphy(1)	11,064,666	33.0%	%
John Schmid	—	— %	
All current executive officers and directors as a group (7 persons)(9)	25,894,440	76.4%	%

* Represents beneficial ownership of less than 1%.

(1) Represents shares of common stock issuable upon conversion of preferred stock held by Malin Holdings, a wholly owned subsidiary of Malin Corporation plc, or Malin, and may be deemed to be beneficially owned by Malin. Malin may be deemed to share voting and investment power over our securities held by Malin Holdings. Mr. Murphy currently serves as a member of the leadership team at Malin.

Each of Malin and Mr. Murphy disclaims beneficial ownership of these securities except to the extent of its or his pecuniary interest therein. The address of Malin Holdings is 2 Harbour Square, Crofton Road, Dun Laoghaire, Co., Dublin, Ireland.

(2) Represents shares of common stock held by the Eric Ostertag Living Trust dated March 30, 2016, or the Eric Ostertag Trust. Dr. Ostertag is the trustee of the Eric Ostertag Trust.

(3) Represents shares of common stock held by Titan LLC. Titan LLC is owned by the Kora Trust and Dr. Ostertag's minor daughter is the sole beneficiary of the Kora Trust. Therefore, Dr. Ostertag may be deemed to share voting and investment power over our shares held by Titan LLC. Dr. Ostertag disclaims beneficial ownership of these securities except to the extent of his pecuniary interest therein.

(4) Represents shares of common stock issuable upon conversion of preferred stock held by Longitude Venture Partners III, L.P., or LVP III. Longitude Capital Partners III, LLC, or LCP III, is the general partner of LVP III and may be deemed to have voting, investment and dispositive power over our securities held by LVP III. Dr. Hirsch, a member of our board of directors, is a member of LCP III and may be deemed to share voting, investment and dispositive power with respect to our securities held by LVP III. Patrick G. Enright and Juliet Tammenoms Bakker are the managing members of LCP III, or collectively, the Managers, and may each be deemed to share voting, investment and dispositive power over our securities held by LVP III. Each of LCP III, Dr. Hirsch and the Managers disclaims beneficial ownership of these securities, except to the extent of their respective pecuniary interests therein. The address of LVP III is 2740 Sand Hill Road, Menlo Park, CA 94025.

(5) Consists of (a) the shares described in notes (2) and (3) above, (b) 1,198,923 shares of common stock held by Ostertag Family Trust dated March 30, 2016, of which Dr. Ostertag is a trustee, (c) 336,816 share of common stock held by Dr. Ostertag, (d) 207,787 shares of common stock underlying options held by Dr. Ostertag and exercisable within 60 days of September 30, 2018, (e) 22,140 shares of common stock held by Twin Prime Investments, which is an entity wholly owned by Dr. Ostertag, (f) 319,039 share of common stock issuable upon conversion of preferred stock held by Twin Prime Investments, and (g) 437,318 shares of common stock issuable upon conversion of preferred stock held by Transposagen. Dr. Ostertag is a member of the board of directors and majority stockholder of Transposagen. The address of Transposagen is 535 W. Second St., Suite 10, Lexington, KY 40506.

(6) Represents 108,750 shares of common stock underlying options exercisable within 60 days of September 30, 2018.

(7) Consists of (a) 677,877 shares of common stock held by NDS Trust dated September 20, 2013, or the NDS Trust, (b) 132,218 shares of common stock held by Nishan de Silva, and (c) 66,819 shares of common stock held by Naomi Snyder, as Trustee of the Galen Trust, dated April 11, 2018, or the Galen Trust. Nishan de Silva is the trustee of NDS Trust and his minor son is the sole beneficiary of the Galen Trust. The address of Nishan de Silva, the NDS Trust and the Galen Trust is 12707 High Bluff Drive, Suite 200 San Diego, CA 92130.

(8) Represents shares of common stock issuable upon conversion of preferred stock held by LVP III as described in note (4) above. Dr. Hirsch disclaims beneficial ownership of these securities, except to the extent of his pecuniary interest therein. The business address for Dr. Hirsch is 2740 Sand Hill Road, Menlo Park, CA 94025.

(9) Includes the shares described in notes (1) through (6) above, and shares held or issuable upon exercise of stock options by executive officers who are not named in the table above.

DESCRIPTION OF CAPITAL STOCK

A description of our capital stock and the material terms and provisions of our amended and restated certificate of incorporation and amended and restated bylaws that will be in effect upon the completion of this offering and affecting the rights of holders of our capital stock is set forth below. The forms of our amended and restated certificate of incorporation and our amended and restated bylaws to be adopted in connection with this offering are filed as exhibits to the registration statement relating to this prospectus.

Upon the completion of this offering, our amended and restated certificate of incorporation will authorize shares of undesignated preferred stock, the rights, preferences and privileges of which may be designated from time to time by our board of directors.

Upon the completion of this offering, our authorized capital stock will consist of shares, all with a par value of $0.0001 per share, of which:

- shares are designated common stock; and
- shares are designated preferred stock.

As of September 30, 2018, after giving effect to the conversion of all outstanding shares of preferred stock into an aggregate of 18,200,011 shares of our common stock, there were outstanding:

- shares of our common stock held of record by stockholders; and
- shares of our common stock issuable upon exercise of outstanding warrants; and
- shares of our common stock issuable upon exercise of outstanding stock options.

Common Stock

Dividend Rights

Subject to preferences that may apply to shares of preferred stock outstanding at the time, the holders of outstanding shares of our common stock are entitled to receive dividends out of funds legally available if our board of directors, in its discretion, determines to issue dividends and only then at the times and in the amounts that our board of directors may determine. See the section titled “Dividend Policy” for more information.

Voting Rights

The holders of our common stock are entitled to one vote per share. Stockholders do not have the ability to cumulate votes for the election of directors. Our amended and restated certificate of incorporation and amended and restated bylaws that will be in effect upon the completion of this offering will provide for a classified board of directors consisting of three classes of approximately equal size, each serving staggered three-year terms. Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms.

No Preemptive or Similar Rights

Our common stock is not entitled to preemptive rights and is not subject to conversion, redemption or sinking fund provisions.

Right to Receive Liquidation Distributions

Upon our dissolution, liquidation or winding-up, the assets legally available for distribution to our stockholders are distributable ratably among the holders of our common stock, subject to prior satisfaction of all outstanding debt and liabilities and the preferential rights and payment of liquidation preferences, if any, on any outstanding shares of preferred stock.

Preferred Stock

Upon the completion of this offering, no shares of preferred stock will be outstanding, but we will be authorized, subject to limitations prescribed by Delaware law, to issue preferred stock in one or more series, to establish from time to time the number of shares to be included in each series and to fix the designation, powers, preferences and rights of the shares of each series and any associated qualifications, limitations or restrictions. Our board of directors also can increase or decrease the number of shares of any series, but not below the number of shares of that series then outstanding, without any further vote or action by our stockholders. Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the common stock. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in control of our company and may adversely affect the market price of our common stock and the voting and other rights of the holders of common stock. We have no current plan to issue any shares of preferred stock.

Warrants

As of September 30, 2018, there were outstanding warrants to purchase the following shares of our capital stock:

Description	# of Shares of Common Stock After this Offering	Weighted Average Exercise Price After this Offering
Series A-1 preferred stock	116,618	$ 3.43
Series B preferred stock	17,212	$ 5.81

On July 25, 2017, we issued two warrants to purchase an aggregate of 116,618 shares of Series A-1 preferred stock to Oxford Finance LLC at an exercise price of $3.43 per share. The warrants were issued in connection with our entry into a loan and security agreement with the warrant holder. The warrants will become exercisable for an aggregate of 116,618 shares of our common stock at an exercise price equal to $3.43 per share upon completion of this offering. The warrants are exercisable until their expiration on July 25, 2027 unless terminated earlier as a result of certain reorganizations or changes in control as set forth in the warrants.

On August 13, 2018, we issued a warrant to purchase 17,212 shares of Series B preferred stock to Oxford Finance LLC at an exercise price of $5.81 per share. The warrant was issued in connection with our entry into an amendment to the loan and security agreement with the warrant holder. The warrant will become exercisable for an aggregate of 17,212 shares of our common stock at an exercise price equal to $5.81 per share upon completion of this offering. The warrant is exercisable until its expiration on August 13, 2028 unless terminated earlier as a result of certain reorganizations or changes in control as set forth in the warrant.

Options

As of September 30, 2018, there were options to purchase 2,468,240 shares of our common stock outstanding, which were granted under our existing equity incentive plan.

Registration Rights

Following the completion of this offering, the holders of 18,200,011 shares of our common stock issued upon the conversion of our preferred stock will be entitled to contractual rights to require us to register those shares under the Securities Act. These registration rights are provided under the terms of our amended and restated investors' rights agreement between us and the holders of these shares, which was entered into on March 19, 2018.

We will pay all expenses relating to any demand, piggyback or Form S-3 registration described below, other than underwriting discounts and commissions. The registration rights terminate upon the earliest to occur of a liquidation event or the fifth anniversary of the completion of this offering.

Demand Registration Rights

The holders of the registrable securities will be entitled to certain demand registration rights. At any time beginning six months following the completion of this offering, the holders of 50% or more of the registrable securities then outstanding may make a written request that we register some or all of their registrable securities, subject to certain specified conditions and exceptions. We are required to use commercially reasonable efforts to affect the registration. A request for registration must cover securities with an aggregate offering price of at least $10,000,000. We are not obligated to effect more than two of these registrations.

Piggyback Registration Rights

In connection with this offering, holders of our registrable securities were entitled to, and the necessary percentage of holders waived, their rights to notice of this offering and to include their registrable securities in this offering. If we propose to register any additional securities under the Securities Act either for our own account or for the account of other stockholders in another offering, the holders of shares having registration rights will, subject to certain exceptions, be entitled to include their shares in our registration statement, provided that the underwriters of any such offering have the right to limit the number of shares included in the registration. These registration rights are subject to specified other conditions and limitations as set forth in our amended and restated investors' rights agreement.

Form S-3 Registration Rights

At any time after we are qualified to file registration statements on Form S-3, and subject to limitations and conditions specified in the amended and restated investors' rights agreement, the holders of 25% or more of the registrable securities then outstanding may make a written request that we prepare and file a registration statement on Form S-3 under the Securities Act registering the resale of their shares, so long as the aggregate price to the public is at least $2,000,000. We are not obligated to effect more than two of these Form S-3 registrations in any 12-month period.

Anti-Takeover Provisions

Delaware Law

Upon the completion of this offering, we will be governed by the provisions of Section 203 of the Delaware General Corporation Law regulating corporate takeovers. This section prevents some Delaware corporations from engaging, under some circumstances, in a business combination, which includes a merger or sale of at least 10% of the corporation's assets with any interested stockholder, meaning a stockholder 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 the corporation's outstanding voting stock, unless:

- the transaction is approved by the board of directors prior to the time that the interested stockholder became an interested stockholder;
- upon closing of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the voting stock outstanding those shares owned (i) by persons who are directors and also officers and (ii) employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or

- subsequent to such time that the stockholder became an interested stockholder the business combination is approved by the board of directors and authorized at an annual or special meeting of stockholders by at least two-thirds of the outstanding voting stock which is not owned by the interested stockholder.

A Delaware corporation may "opt out" of these provisions with an express provision in its original certificate of incorporation or an express provision in its certificate of incorporation or amended and restated bylaws resulting from a stockholders' amendment approved by at least a majority of the outstanding voting shares. We have not opted out of these provisions. As a result, mergers or other takeover or change in control attempts of us may be discouraged or prevented.

Certificate of Incorporation and Bylaw Provisions

Upon the completion of this offering, our amended and restated certificate of incorporation and our amended and restated bylaws will include a number of provisions that may have the effect of deterring hostile takeovers or delaying or preventing changes in control of our management team, including the following:

- *Board of Directors Vacancies*. Our amended and restated certificate of incorporation and amended and restated bylaws will authorize our board of directors to fill vacant directorships, including newly-created seats. In addition, the number of directors constituting our board of directors will be set only by resolution adopted by a majority vote of our entire board of directors. These provisions may prevent a stockholder from increasing the size of our board of directors and gaining control of our board of directors by filling the resulting vacancies with its own nominees.
- *Classified Board*. Our amended and restated certificate of incorporation and amended and restated bylaws will provide that our board of directors will be classified into three classes of directors, each of which will hold office for a three-year term. In addition, directors may only be removed from the board of directors for cause and only by the approval of 66 2/3% of our then-outstanding shares of our common stock. A third party may be discouraged from making a tender offer or otherwise attempting to obtain control of us as it is more difficult and time consuming for stockholders to replace a majority of the directors on a classified board of directors.
- *Stockholder Action; Special Meeting of Stockholders*. Our amended and restated certificate of incorporation will provide that stockholders will not be able to take action by written consent and will only be able to take action at annual or special meetings of our stockholders. Stockholders will not be permitted to cumulate their votes for the election of directors. Our amended and restated bylaws will further provide that special meetings of our stockholders may be called only by a majority vote of our entire board of directors, the chairman of our board of directors or our chief executive officer.
- *Advance Notice Requirements for Stockholder Proposals and Director Nominations*. Our amended and restated bylaws will provide advance notice procedures for stockholders seeking to bring business before our annual meeting of stockholders, or to nominate candidates for election as directors at any meeting of stockholders. Our amended and restated bylaws will also specify certain requirements regarding the form and content of a stockholder's notice. These provisions may make it more difficult for our stockholders to bring matters before our annual meeting of stockholders or to make nominations for directors at our meetings of stockholders.
- *Issuance of Undesignated Preferred Stock*. Our board of directors will have the authority, without further action by the holders of common stock, to issue up to shares of undesignated preferred stock with rights and preferences, including voting rights, designated from time to time by our board of directors. The existence of authorized but unissued shares of preferred stock will enable our board of directors to render more difficult or discourage an attempt to obtain control of us by means of a merger, tender offer, proxy contest or otherwise.

Choice of Forum

Upon the completion of this offering, our amended and restated certificate of incorporation will provide that, to the fullest extent permitted by law, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for (i) any derivative action or proceeding brought on our behalf, (ii) any action asserting a claim of breach of a fiduciary duty owed by any of our directors or officers to us or our stockholders, (iii) any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law or our amended and restated certificate of incorporation or amended and restated bylaws, and (iv) any action asserting a claim against us governed by the internal affairs doctrine; provided, that, this provision would not apply to suits brought to enforce a duty or liability created by the Exchange Act. Furthermore, our amended and restated certificate of incorporation will also provide that unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States shall be the exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act. The enforceability of similar choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that a court could find these types of provisions to be inapplicable or unenforceable.

Transfer Agent and Registrar

Upon the completion of this offering, the transfer agent and registrar for our common stock will be . The transfer agent's address is .

Listing

We have applied to list our common stock on The Nasdaq Global Select Market under the symbol "PSTX."

SHARES ELIGIBLE FOR FUTURE SALE

Rule 144

In general, under Rule 144 as currently in effect, a person who has beneficially owned shares of our restricted common stock for at least six months would be entitled to sell their securities provided that such person is not deemed to have been one of our affiliates at the time of, or at any time during the 90 days preceding, a sale, and we are subject to the periodic reporting requirements of the Exchange Act, for at least 90 days before the sale. In addition, under Rule 144, any person who is not an affiliate of ours and has held their shares for at least one year, including the holding period of any prior owner other than one of our affiliates, would be entitled to sell an unlimited number of shares immediately upon the completion of this offering without regard to whether current public information about us is available. Persons who have beneficially owned shares of our restricted common stock for at least six months but who are our affiliates at the time of, or any time during the 90 days preceding, a sale, would be subject to additional restrictions, by which such person would be entitled to sell within any three-month period only a number of securities that does not exceed the greater of either of the following:

- 1% of the number of common shares then outstanding, which will equal approximately shares immediately after this offering assuming no exercise of the underwriters' option to purchase additional shares, based on the number of common shares outstanding as of September 30, 2018; or
- the average weekly trading volume of our common shares during the four calendar weeks preceding the filing of a notice on Form 144 with respect to the sale;

provided, in each case, that we have been subject to the Exchange Act periodic reporting requirements for at least 90 days before the sale. Such sales both by affiliates and by non-affiliates must also comply with the manner of sale, current public information and notice provisions of Rule 144.

Rule 701

Any of our service providers who purchased shares under a written compensatory plan or contract prior to this offering may be entitled to rely on the resale provisions of Rule 701. Rule 701, as currently in effect, permits resales of shares, including by affiliates, in reliance upon Rule 144 but without compliance with certain restrictions, including the holding period requirement, of Rule 144. Rule 701 further provides that non-affiliates may sell such shares in reliance on Rule 144 without having to comply with the public information, volume limitation or notice provisions of Rule 144. All holders of Rule 701 shares are required to wait until 90 days after the date of this prospectus before selling such shares if such resale is pursuant to Rule 701. All Rule 701 shares are, however, subject to lock-up agreements and will only become eligible for sale upon the expiration of these lock-up agreements.

Lock-Up Agreements

In connection with this offering, we and all directors and officers and the holders of substantially all of our outstanding stock and stock options have agreed with the underwriters, subject to certain exceptions, not to 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, lend, or otherwise transfer or dispose of, directly or indirectly, shares of our common stock or any securities convertible into or exchangeable for shares of our common stock or enter into any swap or other arrangement that transfers to another any of the economic consequences of ownership of our common stock during the period from the date of this prospectus continuing through the date 180 days after the date of this prospectus, except with the prior written consent of the underwriters. These agreements are subject to certain exceptions, as set forth in the section titled "Underwriting."

Certain of our employees, including our executive officers, and directors may enter into written trading plans that are intended to comply with Rule 10b5-1 under the Exchange Act. Sales under these trading plans

would not be permitted until the expiration of the lock-up agreements relating to our initial public offering described above.

Registration Rights

Upon completion of this offering, the holders of 18,200,011 shares of our common stock will be entitled to rights with respect to the registration of the sale of these shares under the Securities Act. See the section titled “Description of Capital Stock—Registration Rights.” All of these shares are subject to lock-up restrictions under agreements with us and/or the underwriters. Following the expiration of the lock-up period, registration of these shares under the Securities Act would result in the shares becoming freely tradable without restriction under the Securities Act immediately upon the effectiveness of the registration.

Equity Plans

We intend to file a registration statement on Form S-8 under the Securities Act covering all of the shares of our common stock subject to options outstanding or reserved for issuance under our equity plans. We expect to file this registration statement as soon as practicable after the completion of this offering. This registration statement will become effective immediately upon filing, and shares covered by this registration statement will thereupon be eligible for sale in the public markets, subject to vesting restrictions, the lock-up agreements described above and Rule 144 limitations applicable to affiliates. For a more complete discussion of our stock plans, see the section titled “Executive Compensation—Equity Plans.”

MATERIAL U.S. FEDERAL INCOME TAX CONSIDERATIONS TO NON-U.S. HOLDERS OF COMMON STOCK

The following is a discussion of the material U.S. federal income tax consequences applicable to non-U.S. holders (as defined below) with respect to their purchase, ownership and disposition of shares of our common stock issued pursuant to this offering, but does not purport to be a complete analysis of all potential tax effects. All prospective non-U.S. holders of our common stock should consult their own tax advisors with respect to the U.S. federal income tax consequences of the purchase, ownership and disposition of our common stock, as well as any consequences arising under the laws of any other taxing jurisdiction, including any state, local and non-U.S. tax consequences and any U.S. federal non-income tax consequences. In general, a non-U.S. holder means a beneficial owner of our common stock (other than a partnership or an entity or arrangement treated as a partnership for U.S. federal income tax purposes) that is not, for U.S. federal income tax purposes:

- an individual who is a citizen or resident of the United States;
- a corporation, or an entity treated as a corporation for U.S. federal income tax purposes, created or organized in the United States or 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 if (1) a U.S. court can exercise primary supervision over the trust's administration and one or more "United States persons" have the authority to control all of the trust's substantial decisions or (2) the trust has a valid election in effect under applicable U.S. Treasury Regulations to be treated as a "United States person."

This discussion is based on current provisions of the U.S. Internal Revenue Code of 1986, as amended, which we refer to as the Code, existing U.S. Treasury Regulations promulgated thereunder, published administrative rulings and judicial decisions, all as in effect as of the date of this prospectus supplement. These laws are subject to change and to differing interpretation, possibly with retroactive effect. Any change or differing interpretation could alter the tax consequences to non-U.S. holders described in this prospectus supplement.

This discussion is limited to non-U.S. holders that hold shares of 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 aspects of U.S. federal income taxation that may be relevant to a particular non-U.S. holder in light of that non-U.S. holder's individual circumstances, nor does it address any aspects of U.S. estate or gift tax, or any state, local or non-U.S. taxes. This discussion also does not consider any specific facts or circumstances that may apply to a non-U.S. holder and does not address the special tax rules applicable to particular non-U.S. holders, such as holders that own, or are deemed to own, more than 5% of our capital stock (except to the extent specifically set forth below), corporations that accumulate earnings to avoid U.S. federal income tax, tax-exempt organizations, banks, financial institutions, insurance companies, brokers, dealers or traders in securities, commodities or currencies, tax-qualified retirement plans, holders subject to the alternative minimum tax or Medicare contribution tax, holders who hold or receive our common stock pursuant to the exercise of employee stock options or otherwise as compensation, holders holding our common stock as part of a hedge, straddle or other risk reduction strategy, conversion transaction or other integrated investment, holders deemed to sell our common stock under the constructive sale provisions of the Code, controlled foreign corporations, passive foreign investment companies, U.S. expatriates and certain former citizens or long-term residents of the United States and "qualified foreign pension funds" as defined in Section 897(1)(2) of the Code and entities all of the interests of which are held by qualified foreign pension funds.

In addition, this discussion does not address the tax treatment of partnerships (or entities or arrangements that are treated as partnerships for U.S. federal income tax purposes) or persons that hold their common stock

through such partnerships or such entities or arrangements. If a partnership, including any entity or arrangement treated as a partnership for U.S. federal income tax purposes, holds shares of our common stock, the U.S. federal income tax treatment of a partner in such partnership will generally depend upon the status of the partner, the activities of the partnership and certain determinations made at the partner level. Such partners and partnerships should consult their own tax advisors regarding the tax consequences of the purchase, ownership and disposition of our common stock.

There can be no assurance that the Internal Revenue Service, which we refer to as the IRS, will not challenge one or more of the tax consequences described herein, and we have not obtained, nor do we intend to obtain, a ruling with respect to the U.S. federal income tax consequences with respect to the matters discussed below.

Distributions on Our Common Stock

Distributions, if any, on our common stock generally 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. If a distribution exceeds our current and accumulated earnings and profits, the excess will be treated as a tax-free return of the non-U.S. holder's investment, up to such holder's adjusted tax basis in the common stock. Any remaining excess will be treated as capital gain from the sale or exchange of such common stock, subject to the tax treatment described below in the subsection titled "—Sale, Exchange or Other Disposition of Our Common Stock."

Subject to the discussions below regarding effectively connected income, backup withholding and foreign accounts, dividends paid to a non-U.S. holder will generally be subject to withholding of U.S. federal income tax at a 30% rate or such lower rate as may be specified by an applicable income tax treaty. A non-U.S. holder that is eligible for a reduced rate of U.S. withholding tax under an income tax treaty may obtain a refund or credit of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. A non-U.S. holder of our common stock who claims the benefit of an applicable income tax treaty generally will be required to provide a properly executed IRS Form W-8BEN or W-8BEN-E (or successor form) and satisfy relevant certification and other requirements. Non-U.S. holders are urged to consult their tax advisors regarding their entitlement to benefits under a relevant income tax treaty.

Dividends that are treated as effectively connected with a trade or business conducted by a non-U.S. holder within the United States and, if an applicable income tax treaty so provides, that are attributable to a permanent establishment or a fixed base maintained by the non-U.S. holder within the United States are generally exempt from the 30% withholding tax if the non-U.S. holder satisfies applicable certification and disclosure requirements. To claim the exemption, the non-U.S. holder must furnish to us or 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. However, such U.S. effectively connected income is taxed, on a net income basis, at the same graduated U.S. federal income tax rates applicable to "United States persons" (as defined in the Code), unless a specific treaty exemption applies. Any U.S. effectively connected income received by anon-U.S. holder that is a corporation may also, under certain circumstances, be subject to an additional "branch profits tax" at a 30% rate or such lower rate as may be specified by an applicable income tax treaty.

Sale, Exchange or Other Disposition of Our Common Stock

Subject to the discussions below regarding backup withholding and foreign accounts, in general, a non-U.S. holder will not be subject to any U.S. federal income tax on any gain realized upon such holder's sale, exchange or other disposition of shares of our common stock unless:

- the gain is effectively connected with a U.S. trade or business of the non-U.S. holder and, if an applicable income tax treaty so provides, is attributable to a permanent establishment or a fixed base maintained in

the United States by such non-U.S. holder, in which case the non-U.S. holder generally will be taxed, on a net income basis, at the graduated U.S. federal income tax rates applicable to "United States persons" (as defined in the Code) and, if the non-U.S. holder is a foreign corporation, the branch profits tax described above in the subsection titled "—Distributions on Our Common Stock" may also apply;

- the non-U.S. holder is a nonresident alien individual who is present in the United States for 183 days or more in the taxable year of the disposition and certain other conditions are met, in which case the non-U.S. holder will be subject to a 30% tax (or such lower rate as may be specified by an applicable income tax treaty) on the net gain derived from the disposition, which may be offset by U.S. source capital losses of the non-U.S. holder, if any (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; or
- our common stock constitutes a U.S. real property interest because we are, or have been, at any time during the five-year period preceding such disposition (or the non-U.S. holder's holding period, if shorter) a "U.S. real property holding corporation" (as defined in the Code). Even if we are or become a U.S. real property holding corporation, provided that our common stock is "regularly traded" (as defined in the applicable Treasury Regulations) on an established securities market, our common stock will be treated as a U.S. real property interest only with respect to a non-U.S. holder that holds more than 5% of our outstanding common stock, directly or indirectly, actually or constructively, during the shorter of the five-year period ending on the date of the disposition or the period that the non-U.S. holder held our common stock. In such case, such non-U.S. holder generally will be taxed on its net gain derived from the disposition at the graduated U.S. federal income tax rates applicable to "United States persons" (as defined in the Code). 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. Although there can be no assurance, we do not believe that we are, or have been, a U.S. real property holding corporation, or that we are likely to become one in the future. No assurance can be provided that our common stock will be regularly traded on an established securities market for purposes of the rules described above.

Backup Withholding and Information Reporting

We must report annually to the IRS and to each non-U.S. holder the gross amount of the dividends on our common stock paid to such holder and the tax withheld, if any, with respect to such dividends. Non-U.S. holders will have to comply with specific certification procedures to establish that the holder is not a "United States persons" (as defined in the Code) in order to avoid backup withholding at the applicable rate with respect to dividends on our common stock. U.S. backup withholding generally will not apply to a non-U.S. holder who provides a properly executed IRS Form W-8BEN or W-8BEN-E or otherwise establishes an exemption.

Information reporting and backup withholding will generally apply to the proceeds of a disposition of our common stock by a non-U.S. holder effected by or through the U.S. office of any broker, U.S. or foreign, unless the holder certifies its status as a non-U.S. holder and satisfies certain other requirements, or otherwise establishes an exemption. Generally, information reporting and backup withholding will not apply to a payment of disposition proceeds to a non-U.S. holder where the transaction is effected outside the United States through a non-U.S. office of a broker. However, for information reporting purposes, dispositions effected through a non-U.S. office of a broker with substantial U.S. ownership or operations generally will be treated in a manner similar to dispositions effected through a U.S. office of a broker. Non-U.S. holders should consult their own tax advisors regarding the application of the information reporting and backup withholding rules to them.

Copies of information returns may be made available to the tax authorities of the country in which the non-U.S. holder resides or is established under the provisions of a specific income tax treaty or agreement.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules from a payment to a non-U.S. holder may be allowed as a credit against the non-U.S. holder's U.S. federal income tax liability, if any, and may entitle such holder to a refund, provided that the required information is timely furnished to the IRS.

Foreign Accounts

The Code generally imposes a U.S. federal withholding tax of 30% on dividends and the gross proceeds of a disposition of our common stock paid to a "foreign financial institution" (as specifically defined for this purpose), unless such institution enters into an agreement with the U.S. government to, among other things, withhold on certain payments and to collect and provide to the U.S. tax authorities substantial information regarding U.S. account holders of such institution (which may include certain equity and debt holders of such institution, as well as certain account holders that are foreign entities with U.S. owners). Foreign financial institutions located in jurisdictions that have an intergovernmental agreement with the United States governing these withholding and reporting requirements may be subject to different rules. This U.S. federal withholding tax of 30% also applies to dividends and the gross proceeds of a disposition of our common stock paid to a non-financial foreign entity, unless such entity provides the withholding agent with either a certification that it does not have any substantial direct or indirect U.S. owners or information regarding substantial direct and indirect U.S. owners of the entity. The withholding tax described above will not apply if the foreign financial institution or non-financial foreign entity otherwise qualifies for an exemption from the rules. The withholding provisions described above currently apply to dividends on our common stock and, beginning on January 1, 2019, will apply with respect to gross proceeds of a sale or other disposition of our common stock. Under certain circumstances, a non-U.S. holder might be eligible for refunds or credits of such taxes. Non-U.S. holders are encouraged to consult with their own tax advisors regarding the possible implications of these rules on their investment in our common stock.

EACH PROSPECTIVE INVESTOR SHOULD CONSULT ITS OWN TAX ADVISOR REGARDING THE TAX CONSEQUENCES OF PURCHASING, HOLDING AND DISPOSING OF OUR COMMON STOCK, INCLUDING THE CONSEQUENCES OF ANY PROPOSED OR RECENT CHANGES IN APPLICABLE LAW, AS WELL AS TAX CONSEQUENCES ARISING UNDER ANY STATE, LOCAL, NON-U.S. OR U.S. FEDERAL NON-INCOME TAX LAWS OR UNDER ANY APPLICABLE TAX TREATY.

UNDERWRITING

Citigroup Global Markets Inc., Credit Suisse Securities (USA) LLC and Wells Fargo Securities, LLC are acting as joint book-running managers of the offering and as representatives of the underwriters named below. Subject to the terms and conditions stated in the underwriting agreement dated the date of this prospectus, each underwriter named below has severally agreed to purchase, and we have agreed to sell to that underwriter, the number of shares set forth opposite the underwriter's name.

Underwriter	Number of Shares
Citigroup Global Markets Inc.	
Credit Suisse Securities (USA) LLC	
Wells Fargo Securities, LLC	
Total	

The underwriting agreement provides that the obligations of the underwriters to purchase the shares included in this offering are subject to approval of legal matters by counsel and to other conditions. The underwriters are obligated to purchase all the shares (other than those covered by the underwriters' option to purchase additional shares described below) if they purchase any of the shares.

Shares sold by the underwriters to the public will initially be offered at the initial public offering price set forth on the cover of this prospectus. Any shares sold by the underwriters to securities dealers may be sold at a discount from the initial public offering price not to exceed $ per share. If all the shares are not sold at the initial offering price, the underwriters may change the offering price and the other selling terms. The representatives have advised us that the underwriters do not intend to make sales to discretionary accounts.

If the underwriters sell more shares than the total number set forth in the table above, we have granted to the underwriters an option, exercisable for 30 days from the date of this prospectus, to purchase up to additional shares at the public offering price less the underwriting discounts and commissions. To the extent the option is exercised, each underwriter must purchase a number of additional shares approximately proportionate to that underwriter's initial purchase commitment. Any shares issued or sold under the option will be issued and sold on the same terms and conditions as the other shares that are the subject of this offering.

We, our officers and directors and substantially all of our other stockholders and optionholders have agreed that, subject to specified exceptions, for a period of 180 days from the date of this prospectus, we and they will not, without the prior written consent of Citigroup and Credit Suisse, dispose of or hedge any shares or any securities convertible into or exchangeable for our common stock. Citigroup and Credit Suisse in their sole discretion may release any of the securities subject to these lock-up agreements at any time, which, in the case of officers and directors, shall be with notice.

Prior to this offering, there has been no public market for our shares. Consequently, the initial public offering price for the shares was determined by negotiations between us and the representatives. Among the factors considered in determining the initial public offering price were our results of operations, our current financial condition, our future prospects, our markets, the economic conditions in and future prospects for the industry in which we compete, our management, and currently prevailing general conditions in the equity securities markets, including current market valuations of publicly traded companies considered comparable to our company. We cannot assure you, however, that the price at which the shares will sell in the public market after this offering will not be lower than the initial public offering price or that an active trading market in our shares will develop and continue after this offering.

We have applied to list our common stock on The Nasdaq Global Select Market under the symbol "PSTX."

The following table shows the underwriting discounts and commissions that we are to pay to the underwriters in connection with this offering. These amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase additional shares.

	Paid by Poseida Therapeutics, Inc.	
	No Exercise	Full Exercise
Per share	$	$
Total	$	$

We estimate that our portion of the total expenses of this offering, excluding underwriting discounts and commissions payable by us, will be $. We have also agreed to reimburse the underwriters for certain of their expenses in an amount up to $.

In connection with the offering, the underwriters may purchase and sell shares in the open market. Purchases and sales in the open market may include short sales, purchases to cover short positions, which may include purchases pursuant to the over-allotment option, and stabilizing purchases.

- Short sales involve secondary market sales by the underwriters of a greater number of shares than they are required to purchase in the offering.
  - "Covered" short sales are sales of shares in an amount up to the number of shares represented by the underwriters' option to purchase additional shares.
  - "Naked" short sales are sales of shares in an amount in excess of the number of shares represented by the underwriters' option to purchase additional shares.
- Covering transactions involve purchases of shares either pursuant to the underwriters' option to purchase additional shares or in the open market in order to cover short positions.
  - To close a naked short position, the underwriters must purchase shares in the open market. 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 shares in the open market after pricing that could adversely affect investors who purchase in the offering.
  - To close a covered short position, the underwriters must purchase shares in the open market or must exercise the option to purchase additional shares. In determining the source of shares to close the covered short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which they may purchase shares through the option to purchase additional shares.
- Stabilizing transactions involve bids to purchase shares so long as the stabilizing bids do not exceed a specified maximum.

Purchases to cover short positions and stabilizing purchases, as well as other purchases by the underwriters for their own accounts, may have the effect of preventing or retarding a decline in the market price of the shares. They may also cause the price of the shares to be higher than the price that would otherwise exist in the open market in the absence of these transactions. The underwriters may conduct these transactions on The Nasdaq Global Select Market, in the over-the-counter market or otherwise. If the underwriters commence any of these transactions, they may discontinue them at any time.

Conflicts of Interest

The underwriters are full service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, principal investment, hedging, financing and brokerage activities. The underwriters and their respective affiliates have in

the past performed commercial banking, investment banking and advisory services for us from time to time for which they have received customary fees and reimbursement of expenses and may, from time to time, engage in transactions with and perform services for us in the ordinary course of their business for which they may receive customary fees and reimbursement of expenses. In the ordinary course of their various business activities, the underwriters and their respective affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (which may include bank loans and/or credit default swaps) for their own account and for the accounts of their customers and may at any time hold long and short positions in such securities and instruments. Such investments and securities activities may involve securities and/or instruments of ours or our affiliates. The underwriters and their affiliates may also make investment recommendations and/or publish or express independent research views in respect of such securities or financial instruments and may hold, or recommend to clients that they acquire, long and/or short positions in such securities and instruments.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act, or to contribute to payments the underwriters may be required to make because of any of those liabilities.

Notice to Prospective Investors in the European Economic Area

In relation to each member state of the European Economic Area that 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 (the relevant implementation date), an offer of shares described in this prospectus may not be made to the public in that relevant member state other than:

- to any legal entity which is a qualified investor as defined in the Prospectus Directive;
- to fewer than 100 or, if the relevant member state has implemented the relevant provision of the 2010 PD Amending Directive, 150 natural or legal persons (other than qualified investors as defined in the Prospectus Directive), as permitted under the Prospectus Directive, subject to obtaining the prior consent of the relevant Dealer or Dealers nominated by us for any such offer; or
- in any other circumstances falling within Article 3(2) of the Prospectus Directive.

provided that no such offer of shares shall require us or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Directive.

For purposes of this provision, the expression an “offer of securities to the public” in any relevant member state means the communication in any form and by any 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 or subscribe for the shares, as the expression may be varied in that member state by any measure implementing the Prospectus Directive in that member state, and the expression “Prospectus Directive” means Directive 2003/71/EC (and amendments thereto, including the 2010 PD Amending Directive, to the extent implemented in the relevant member state) and includes any relevant implementing measure in the relevant member state. The expression 2010 PD Amending Directive means Directive 2010/73/EU.

The sellers of the shares have not authorized and do not authorize the making of any offer of shares through any financial intermediary on their behalf, other than offers made by the underwriters with a view to the final placement of the shares as contemplated in this prospectus. Accordingly, no purchaser of the shares, other than the underwriters, is authorized to make any further offer of the shares on behalf of the sellers or the underwriters.

Notice to Prospective Investors in the United Kingdom

This prospectus is only being distributed to, and is only directed at, persons in the United Kingdom that are qualified investors within the meaning of Article 2(1)(e) of the Prospectus Directive that are also (i) investment

professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Order") or (ii) high net worth entities, and other persons to whom it may lawfully be communicated, falling within Article 49(2)(a) to (d) of the Order (each such person being referred to as a "relevant person"). This prospectus and its contents are confidential and should not be distributed, published or reproduced (in whole or in part) or disclosed by recipients to any other persons in the United Kingdom. Any person in the United Kingdom that is not a relevant person should not act or rely on this document or any of its contents.

Notice to Prospective Investors in France

Neither this prospectus nor any other offering material relating to the shares described in this prospectus has been submitted to the clearance procedures of the *Autorité des Marchés Financiers* or of the competent authority of another member state of the European Economic Area and notified to the *Autorité des Marchés Financiers.* The shares have not been offered or sold and will not be offered or sold, directly or indirectly, to the public in France. Neither this prospectus nor any other offering material relating to the shares has been or will be:

- released, issued, distributed or caused to be released, issued or distributed to the public in France; or
- used in connection with any offer for subscription or sale of the shares to the public in France.

Such offers, sales and distributions will be made in France only:

- to qualified investors (*investisseurs qualifiés*) and/or to a restricted circle of investors (*cercle restreint d'investisseurs*), in each case investing for their own account, all as defined in, and in accordance with articles L.411-2, D.411-1, D.411-2, D.734-1, D.744-1, D.754-1 and D.764-1 of the French *Code monétaire et financier*;
- to investment services providers authorized to engage in portfolio management on behalf of third parties; or
- in a transaction that, in accordance with article L.411-2-II-1° -or-2° -or 3° of the French *Code monétaire et financier* and article 211-2 of the General Regulations (*Règlement Général*) of the *Autorité des Marchés Financiers*, does not constitute a public offer (*appel public à l'épargne*).

The shares may be resold directly or indirectly, only in compliance with articles L.411-1, L.411-2, L.412-1 and L.621-8 through L.621-8-3 of the French *Code monétaire et financier*.

Notice to Prospective Investors in Hong Kong

The shares may not be offered or sold in Hong Kong by means of any document other than (i) in circumstances which do not constitute an offer to the public within the meaning of the Companies Ordinance (Cap. 32, Laws of Hong Kong), or (ii) to "professional investors" within the meaning of the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made thereunder, or (iii) in other circumstances which do not result in the document being a "prospectus" within the meaning of the Companies Ordinance (Cap. 32, Laws of Hong Kong) and no advertisement, invitation or document relating to the shares may be issued or may be in the possession of any person for the purpose of issue (in each case 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 in Hong Kong (except if permitted to do so under the 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" within the meaning of the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made thereunder.

Notice to Prospective Investors in Japan

The shares offered in this prospectus have not been and will not be registered under the Financial Instruments and Exchange Law of Japan. The shares have not been offered or sold and will not be offered or

sold, directly or indirectly, in Japan or to or for the account of any resident of Japan (including any corporation or other entity organized under the laws of Japan), except (i) pursuant to an exemption from the registration requirements of the Financial Instruments and Exchange Law and (ii) in compliance with any other applicable requirements of Japanese law.

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 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 Singapore other than (i) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore (the "SFA"), (ii) 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 (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA, in each case subject to compliance with conditions set forth in the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

- 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
- 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,

shares, debentures and units of shares and debentures 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:

- to an institutional investor (for corporations, under Section 274 of the SFA) or to a relevant person defined in Section 275(2) of the SFA, or to any person pursuant to an offer that is made on terms that such shares, debentures and units of shares and debentures of that corporation or such rights and interest in that trust are acquired at a consideration of not less than $200,000 (or its equivalent in a foreign currency) for each transaction, whether such amount is to be paid for in cash or by exchange of securities or other assets, and further for corporations, in accordance with the conditions specified in Section 275 of the SFA;
- where no consideration is or will be given for the transfer; or
- where the transfer is by operation of law.

Notice to Prospective Investors in Switzerland

This document is not intended to constitute an offer or solicitation to purchase or invest in the shares described herein. The shares may not be publicly offered, sold or advertised, directly or indirectly, in, into or from Switzerland and will not be listed on the SIX Swiss Exchange or on any other exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares constitutes a prospectus as such term is understood pursuant to article 652a or article 1156 of the Swiss Code of Obligations or a listing prospectus within the meaning of the listing rules of the SIX Swiss Exchange or any other regulated trading facility in Switzerland, and neither this document nor any other offering or marketing material relating to the shares 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, nor the Company nor the shares have been or will be filed with or approved by any Swiss regulatory authority. The

shares are not subject to the supervision by any Swiss regulatory authority, e.g., the Swiss Financial Markets Supervisory Authority FINMA (FINMA), and investors in the shares will not benefit from protection or supervision by such authority.

Notice to Prospective Investors in Canada

The shares may be sold in Canada 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 offering memorandum (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* (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.

LEGAL MATTERS

The validity of the shares of common stock offered by this prospectus will be passed upon for us by Cooley LLP, San Diego, California. Certain legal matters in connection with this offering will be passed upon for the underwriters by Latham & Watkins LLP, San Diego, California.

EXPERTS

The consolidated financial statements as of December 31, 2016 and December 31, 2017 and for each of the two years in the period ended December 31, 2017 included in this prospectus have been so included in reliance on the report (which contains an explanatory paragraph relating to our ability to continue as a going concern as described in Note 1 to the consolidated financial statements) of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

WHERE YOU CAN FIND ADDITIONAL 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 by this prospectus. 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 to the registration statement. Please refer to the registration statement and exhibits for further information with respect to the common stock offered by this prospectus. Statements contained in this prospectus regarding the contents of any contract or other document are only summaries. With respect to any contract or document that is filed as an exhibit to the registration statement, you should refer to the exhibit for a copy of the contract or document, and each statement in this prospectus regarding that contract or document is qualified by reference to the exhibit. The SEC maintains a website that contains reports, proxy and information statements and other information regarding issuers, like us, that file documents electronically with the SEC. The address of that website is www.sec.gov. The information on the SEC's website is not part of this prospectus, and any references to this web site or any other web site are inactive textual references only.

Upon completion of this offering, we will become subject to the information and reporting requirements of the Exchange Act, and, in accordance with this law, will be required to file periodic reports, proxy statements and other information with the SEC. These periodic reports, proxy statements and other information will be available on the website of the SEC referred to above. We also maintain a website at www.poseida.com, at which you may access these materials free of charge as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. The information contained on, or that can be accessed through, our website is not a part of this prospectus. Investors should not rely on any such information in deciding whether to purchase our common stock. We have included our website address in this prospectus solely as an inactive textual reference.

Poseida Therapeutics, Inc.

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of Poseida Therapeutics, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Poseida Therapeutics, Inc. and its subsidiaries as of December 31, 2017 and 2016, and the related consolidated statements of operations, of changes in convertible preferred stock and stockholders' deficit and of cash flows for the years then ended, including the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated 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 their operations and their cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Substantial Doubt About the Company's Ability to Continue as a Going Concern

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the consolidated financial statements, the Company has experienced net losses and negative cash flows from operations since its inception that raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's consolidated 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 of these consolidated financial statements 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 consolidated financial statements are free of material misstatement, whether due to error or fraud.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated 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 consolidated 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 consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ PricewaterhouseCoopers LLP

San Diego, California
November 1, 2018

We have served as the Company's auditor since 2015.

Poseida Therapeutics, 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	$ 17,892	$ 15,625
Accounts receivable	865	—
Prepaid expenses and other current assets	357	202
Total current assets	19,114	15,826
Property and equipment, net	1,892	1,725
Intangible assets, net	2,892	2,604
Goodwill	4,228	4,228
Other long-term assets	63	1,070
Total assets	$ 28,190	$ 25,454
LIABILITIES, CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' DEFICIT		
Current liabilities:		
Accounts payable	$ 1,186	$ 1,164
Accrued and other liabilities	2,362	2,484
Deferred revenue-short-term	2,708	—
Contingent consideration-short-term (inclusive of related party amounts of $1,808 and 1,019, respectively)	4,410	2,485
Term debt-short-term	—	1,111
Total current liabilities	10,666	7,245
Term debt-long-term	—	8,597
Warrant liability	—	275
Deferred tax liability	785	257
Other long-term liabilities	321	478
Total liabilities	11,772	16,851
Commitments and contingencies *(Note 13)*		
Convertible preferred stock (Series A and A-1), $0.0001 par value 10,600,000 and 14,069,976 shares authorized at December 31, 2016 and 2017, respectively; 9,696,798 and 12,950,443 shares issued and outstanding at December 31, 2016 and 2017, respectively; liquidation preference of $42,146 at December 31, 2017	31,063	42,146
Stockholders' deficit:		
Common stock, $0.0001 par value: 31,000,000 and 36,000,000 shares authorized at December 31, 2016 and 2017, respectively; 13,794,692 and 14,667,848 shares issued and outstanding at December 31, 2016 and 2017, respectively	1	1
Additional paid-in capital	(13,018)	(12,255)
Accumulated deficit	(1,628)	(21,290)
Total stockholders' deficit	(14,645)	(33,543)
Total liabilities, convertible preferred stock and stockholders' deficit	$ 28,190	$ 25,454

The accompanying notes are an integral part of these consolidated financial statements.

Poseida Therapeutics, Inc.
CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except share and per share amounts)	Year Ended December 31, 2016	2017
Revenue	$ 9,768	$ 2,985
Operating expenses:		
Research and development	9,264	19,099
General and administrative	5,353	5,479
Increase (decrease) in contingent consideration (inclusive of related party amounts of $0 and $789, respectively)	—	(1,925)
Total operating expenses	14,617	22,653
Loss from operations	(4,849)	(19,688)
Other income (expense):		
Interest expense	—	(558)
Other income (expense), net	109	37
Net loss before income tax	(4,740)	(20,189)
Income tax benefit	165	527
Net loss and comprehensive loss	$ (4,575)	$ (19,662)
Net loss per share attributable to common stockholders, basic and diluted	$ (0.35)	$ (1.38)
Weighted-average shares of common stock outstanding, basic and diluted	12,909,518	14,198,666
Pro forma net loss per share attributable to common stockholders, basic and diluted (unaudited)		$ (0.78)
Pro forma weighted-average shares of common stock outstanding, basic and diluted (unaudited)		25,348,462

The accompanying notes are an integral part of these consolidated financial statements.

Poseida Therapeutics, Inc.
CONSOLIDATED STATEMENTS OF CHANGES IN CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' DEFICIT

(In thousands, except share amounts)	Convertible Preferred Stock		Common Stock		Additional Paid-In Capital	Retained Earnings (Accumulated Deficit)	Total Stockholders' Deficit
	Shares	Amount	Shares	Amount			
Balance at January 1, 2016	6,781,346	$ 22,879	12,223,064	$ 1	$ (14,333)	$ 2,947	$ (11,385)
Net loss	—	—	—	—	—	(4,575)	(4,575)
Issuance of common stock under employee stock compensation plans	—	—	1,135,114	—	353	—	353
Issuance of common stock for acquisition of Vindico	—	—	436,514	—	659	—	659
Issuance of Series A preferred stock for cash, net of issuance costs $1,768	2,915,452	8,184	—	—		—	—
Stock-based compensation expense	—	—	—	—	303	—	303
Balance at December 31, 2016	9,696,798	31,063	13,794,692	1	(13,018)	(1,628)	(14,645)
Net loss	—	—	—	—	—	(19,662)	(19,662)
Issuance of common stock under employee stock compensation plans	—	—	873,156	—	363	—	363
Issuance of Series A-1 preferred stock for cash, net of issuance costs $77	3,253,645	11,083	—	—		—	—
Stock-based compensation expense	—	—	—	—	400	—	400
Balance at December 31, 2017	12,950,443	$ 42,146	14,667,848	$ 1	$ (12,255)	$ (21,290)	$ (33,543)

The accompanying notes are an integral part of these consolidated financial statements.

Poseida Therapeutics, Inc.
CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)	Year Ended December 31, 2016	2017
OPERATING ACTIVITIES		
Net loss	$ (4,575)	$(19,662)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation & amortization expense	220	676
Stock-based compensation	303	400
Change in fair value of contingent liabilities	—	(1,925)
Change in fair value of forward preferred stock contract	(49)	—
Accretion of discount on issued term debt	—	193
Deferred taxes	(167)	(528)
Changes in operating assets and liabilities:	—	—
Accounts receivable	(289)	865
Prepaid expenses and other current assets	(217)	155
Other long-term assets	(63)	(1,007)
Accounts payable	954	(41)
Accrued liabilities	866	728
Deferred revenue	(7,292)	(2,708)
Other long-term liabilities	321	157
Net cash used in operating activities	(9,988)	(22,697)
INVESTING ACTIVITIES		
Purchases of property and equipment	(1,809)	(201)
Acquisition of Vindico, net of cash acquired	(550)	—
Net cash used in investing activities	(2,359)	(201)
FINANCING ACTIVITIES		
Net proceeds from stock option exercises	353	363
Deferred payments to Vindico shareholders	—	(606)
Issuance of Series A financing, net of issuance costs	8,233	—
Issuance of Series A-1 financing, net of issuance costs	—	11,083
Proceeds from term debt	—	10,000
Payment of debt issuance costs	—	(210)
Net cash provided by financing activities	8,586	20,630
Net decrease in cash and cash equivalents	(3,761)	(2,267)
Cash and cash equivalents at beginning of period	21,653	17,892
Cash and cash equivalents at end of period	$17,892	$ 15,625
Non-cash investing and financing activities:		
Issuance of warrants with term debt	$ —	$ 275
Issuance of common stock for acquisition of Vindico	$ 659	$ —
Purchases of property and equipment included in accounts payable and accrued liabilities	$ 84	$ 19
Supplemental disclosure of cash flow information:		
Interest paid	$ —	$ 294

The accompanying notes are an integral part of these consolidated financial statements.

Poseida Therapeutics, Inc.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

NOTE 1—NATURE OF THE BUSINESS AND BASIS OF PRESENTATION

Nature of Operations

Poseida Therapeutics, Inc. (the "Company" or "Poseida") is a clinical-stage biopharmaceutical company focused on leveraging its proprietary next-generation, non-viral gene engineering technologies to create life-saving therapeutics for patients with high unmet medical need.

The Company is subject to risks and uncertainties common to early-stage companies in the biotechnology industry, including, but not limited to, development by competitors of new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with government regulations and the ability to secure additional capital to fund operations. Product candidates currently under development will require significant additional research and development efforts, including extensive preclinical and clinical testing and regulatory approval prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel and infrastructure and extensive compliance-reporting capabilities. Even if the Company's drug development efforts are successful, it is uncertain when, if ever, the Company will realize significant revenue from product sales.

Going Concern

These financial statements have been prepared assuming the Company will continue as a going concern, which assumes the realization of assets and the satisfaction of liabilities and commitments in the normal course of business.

In accordance with Accounting Standards Update (''ASU'') 2014-15, *Presentation of Financial Statements –Going Concern (Subtopic 205-40): Disclosure of Uncertainties About an Entity's Ability to Continue as a Going Concern*, management is required to perform a two-step analysis over its ability to continue as a going concern. Management must first evaluate whether there are conditions and events that raise substantial doubt about the Company's ability to continue as a going concern (step 1). If management concludes that substantial doubt is raised, management is also required to consider whether its plans alleviate that doubt (step 2).

The Company has experienced net losses and negative cash flows from operations since its inception and has relied on its ability to fund its operations primarily through equity financings. The Company expects to continue to incur net losses for at least the next several years. For the years ended December 31, 2016 and 2017, the Company recorded a net loss of $4.6 million and $19.7 million, respectively. Additionally, during the years ended December 31, 2016 and 2017, the Company used cash in operations of $10.0 million and $22.7 million, respectively. As of December 31, 2017, the Company had an accumulated deficit of $21.3 million and cash and cash equivalents of $15.6 million. Additionally, the Company raised $30.5 million in proceeds from the sale of Series B convertible preferred stock in March 2018 (see Note 17). Management has prepared cash flow forecasts which indicate that based on the Company's expected operating losses and negative cash flows, there is substantial doubt about the Company's ability to continue as a going concern without raising additional capital.

The Company's ability to continue as a going concern is dependent upon its ability to raise additional funding. The Company is seeking to complete an initial public offering ("IPO") of its common stock. In the event the Company does not complete an IPO, the Company expects to seek additional funding through private equity financings, debt financings, collaborations or grant funding. However, if the Company is unable to obtain adequate financing, it could be forced to delay, reduce or eliminate its research and development programs or other operations. If any of these events occur, the Company's ability to achieve the development and commercialization goals would be adversely affected. The Company does not have any additional financing in place and there can be no assurance that the Company can obtain financing, if at all, on terms acceptable to it.

Poseida Therapeutics, Inc.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Separation from Transposagen

Poseida was incorporated on December 16, 2014 under the laws of the State of Delaware. On February 9, 2015, the Company separated from Transposagen Biopharmaceuticals, Inc. ("Transposagen"), becoming an independent company as a result of a pro rata distribution of stock by Transposagen ("the "Separation"). As part of the Separation, Transposagen transferred to Poseida certain intellectual property and patents ("IP"). Concurrently the rights to use and license such IP were transferred, through a royalty free license, to Transposagen and Hera Testing Laboratories, Inc. ("Hera"), another entity separated from Transposagen, to support development and future commercialization for their respective fields of use. Poseida uses the IP primarily in the field of therapeutics. On February 9, 2015, Transposagen's shareholders received one share of Poseida's common stock for every one share of Transposagen's common stock held as of the Separation date.

The Company determined that the Separation with Transposagen was a transaction between entities under common control. As such, the transaction was recorded at carryover value in the Company's historical financial statements in accordance with ASC 805-50-30-5. The primary balance that carried forward at the time of the Separation was $15.0 million in deferred revenue related to an upfront payment received by Transposagen in relation to research collaboration agreement and license agreement with Janssen Biotech, Inc. ("Janssen"). As part of the Separation, the collaboration agreement obligations were transferred to Poseida. Upon assumption of the collaboration agreement, the revenue from the upfront payment was recognized by Poseida over the period of the research term (see Note 5). The deferred revenue balance was offset within equity under the net parent company investment in the Company's financial statements prepared when the Separation was consummated.

Basis of Preparation and Consolidation

The consolidated financial statements reflect the Company's financial position, results of operations and cash flows, in conformity with generally accepted accounting principles ("GAAP") in the United States and include the accounts of Poseida Therapeutics, Inc. and its wholly owned subsidiaries. All intercompany transactions and balances have been eliminated.

Revisions and Reclassifications

During the preparation of the Form S-1 filing, the Company identified errors to previously issued financial statements. The Company revised the accompanying balance sheet as of December 31, 2017 to correct a misclassification of preferred stock warrants. This resulted in an increase of $0.3 million in non-current liabilities and a decrease in equity of the same amount. In addition, the Company revised the accompanying statement of cash flows for the year ended December 31, 2017 to correct a misclassification of $0.2 million related to deferred purchase price payments from operating cash flows to financing cash flows. Management evaluated these errors and concluded that they were not material to any previously issued financial statements.

Additionally, the Company has reclassified $1.9 million related to the change in the fair value of the contingent consideration from other income (expense), net to increase (decrease) in contingent consideration in the accompanying statements of operations for the year ended December 31, 2017.

NOTE 2—SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Use of Estimates

The preparation of consolidated financial statements in conformity with GAAP requires the Company to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and

accompanying notes. On an ongoing basis, the Company evaluates its estimates, which include, but are not limited to, estimates related to accrued expenses, contingent consideration, warrant liability stock-based compensation expense, deferred tax valuation allowances and the fair value of common stock. The Company bases its estimates on historical experience and other market-specific or relevant assumptions that it believes to be reasonable under the circumstances. Actual results may differ from those estimates or assumptions.

The Company utilizes significant estimates and assumptions in determining the fair value of its common stock. The Company has utilized various valuation methodologies in accordance with the framework of the 2004 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. Each valuation methodology includes estimates and assumptions that require the Company's judgment. These estimates and assumptions include a number of objective and subjective factors, including the prices at which the Company sold shares of preferred stock and the superior rights, preferences and privileges of the preferred stock relative to the common stock at the time of each grant; external market conditions affecting the biopharmaceutical industry and trends within the biopharmaceutical industry; the Company's financial position, including cash on hand and outstanding debt; the lack of an active public market for the Company's common stock and preferred stock; the likelihood of achieving a liquidity event, such as an IPO or sale of the Company in light of prevailing market conditions; and the analysis of IPOs and the market performance of similar companies in the biopharmaceutical industry. Significant changes to the key assumptions used in the valuations could result in different fair values of common stock at each valuation date.

Segment Information

The Company's sole operations consist of developing therapeutics for patients with high unmet medical need. Accordingly, the Company has determined that it operates in one operating segment. Operating segments are defined as components of an enterprise about which separate financial information is evaluated regularly by the Company's chief operating decision maker, who is its chief executive officer, in deciding how to allocate resources and assess performance. The Company's chief operating decision maker allocates resources and assesses performance based upon discrete financial information at the consolidated level. All of the Company's tangible assets are held in the United States.

Business Combination

The Company includes the results of operations of the businesses that it acquires as of the respective dates of acquisition. The Company allocates the fair value of the purchase price for its acquisitions to the tangible and intangible assets acquired and liabilities assumed based on their respective fair values at the date of acquisition. Goodwill is measured as the excess of the fair value of purchase consideration over the fair values of the assets acquired and liabilities assumed. When determining the fair value of assets acquired and liabilities assumed, the Company makes significant estimates and assumptions, especially with respect to intangible assets. The Company's estimates of fair value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates. During the measurement period, not to exceed one year from the date of acquisition, we may record adjustments to the assets acquired and liabilities assumed, with a corresponding offset to goodwill if new information is obtained related to facts and circumstances that existed as of the acquisition date. After the measurement period, any subsequent adjustments are reflected in the Company's consolidated statements of operations.

Acquisition costs are expensed as incurred.

Poseida Therapeutics, Inc.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Fair Value Measurements

Certain financial instruments are required to be recorded at fair value. Other financial instruments, like cash and cash equivalents, are recorded at cost, which approximates fair value. Additionally, carrying amounts of accounts receivable, accounts payable and accrued liabilities approximate fair value because of the short maturity of those instruments.

Concentration of Business Risk

The Company's revenue and resulting accounts receivable were derived entirely from one collaboration agreement which has since been terminated (see Note 5).

The Company relies, and expects to continue to rely, on a small number of vendors to manufacture supplies and materials for its development programs. These programs could be adversely affected by a significant interruption in these manufacturing services.

Concentration of Credit Risk

Financial instruments that potentially subject the Company to a concentration of credit risk consist of cash and cash equivalents. All of the Company's cash is held with one financial institution. Deposits held at this institution may exceed the amount of insurance provided on such deposits

Cash and Cash Equivalents

Cash consists of deposits with financial institutions. The Company does not have any cash equivalents. The Company utilizes a credit card that requires a cash collateral account to secure its outstanding balance. While cash in this account is not legally restricted, the availability of future credit is dependent upon maintenance of a compensating balance sufficient to cover outstanding balances. The balance held in this account as of both December 31, 2016 and 2017 was $0.2 million. Amounts outstanding on the credit card and recorded as accounts payable as of both December 31, 2016 and 2017 were $0.1 million.

Goodwill and Other Intangible Assets

Intangible assets were acquired as part of a business combination and have been capitalized at their acquisition date fair value. Acquired definite lived intangible assets, which are evaluated whenever events or circumstances would indicate that an adjustment to the estimated useful lives would be appropriate.

The Company will additionally test its goodwill for impairment annually during the fourth quarter, or whenever events or changes in circumstances indicate an impairment may have occurred. Should an impairment exist, the impairment loss would be measured based on the excess of the carrying amount of the asset or asset group over the estimated asset's fair value. Impairment may result from, among other things, deterioration in the performance of the acquired business, adverse results from developmental work, adverse changes in applicable laws or regulations and a variety of other circumstances. In evaluating the recoverability of the carrying value of goodwill, the Company must make assumptions regarding estimated future cash flows and other factors to determine the fair value of the acquired assets. Changes in strategy or market conditions could significantly impact those judgments in the future and require an adjustment to the recorded balances. There were no impairments of goodwill for the years ended December 31, 2016 and 2017.

Indefinite-lived in process research and development ("IPR&D") is not subject to amortization, but is tested annually for impairment or more frequently if there are indicators of impairment. The Company tests its indefinite-lived IPR&D annually for impairment during the fourth quarter. In testing indefinite-lived IPR&D for impairment, the
Company has the option to first assess qualitative factors to determine whether the existence of events or circumstances

would indicate that it is more likely than not that its fair value is less than its carrying amount, or we can perform a quantitative impairment analysis to determine the fair value of the indefinite-lived IPR&D without performing a qualitative assessment. Qualitative factors that we consider include significant underperformance of the business in relation to expectations, significant negative industry or economic trends and significant changes or planned changes in the use of the assets. If the Company chooses to first assess qualitative factors and it determines that it is more likely than not that the fair value of the indefinite-lived IPR&D is less than its carrying amount, the Company would then determine the fair value of the indefinite-lived IPR&D. Under either approach, if the fair value of the indefinite-lived IPR&D is less than its carrying amount, an impairment charge would be recognized for the difference between the fair value and the carrying amount.

The non-compete agreement intangible asset relates to agreements with former Vindico NanoBioTechnology, Inc. ("Vindico") management to not pursue other ventures within the same field of the acquired technology for two years from the date of acquisition. The non-compete agreements will be amortized straight-line over the effective period of the agreement.

Property and Equipment

Property and equipment are stated at cost and depreciated or amortized using the straight-line method, based on their estimated useful lives as follows:

Asset Classification	Estimated Useful Life (years)
Lab equipment	5
Leasehold improvements	Lesser of useful life or lease-term
Computer equipment and software	3
Furniture and fixtures	7

Maintenance and repairs are charged to expense as incurred. When assets are retired or otherwise disposed of, the cost and accumulated depreciation are removed from the Company's consolidated balance sheet and any resulting gain or loss is reflected in the Company's consolidated statement operations.

All leases are evaluated under applicable criteria and classified as either an operating or capital lease. The Company records rent expense on a straight-line basis over the initial term of a lease. The difference between the rent due under the stated periods of the lease compared to that of the straight-line basis is recorded as deferred rent within other long-term liabilities in the Company's consolidated balance sheets.

Property and equipment are reviewed annually for impairment or whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability is measured by comparison of the carrying amount to the future net undiscounted cash flows which the assets are expected to generate. If such assets are considered to be impaired, the impairment to be recognized is measured by the amount by which the carrying amount of the assets exceeds the projected discounted future net cash flows arising from the asset. There has been no impairment of long-lived assets during the years ended December 31, 2016 and 2017.

Revenue Recognition

The Company recognizes revenue in connection with a collaboration agreement which includes upfront license fees, research funding, milestone and royalty payments, when the four revenue recognition criteria are met: (1) persuasive evidence of an arrangement exists; (2) delivery has occurred or services have been rendered; (3) the fee is fixed or determinable; and (4) collectability is reasonably assured.

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Deliverables under this arrangement consists of intellectual property rights and research and development services. The delivered elements under this arrangement are evaluated to determine if they have value to our collaboration partner on a stand-alone basis and whether objective and reliable evidence of fair value of the undelivered item exists. If it is determined that multiple deliverables exist, the consideration is allocated to one or more units of accounting based upon the relative stand-alone selling price of each deliverable. The selling price used for each deliverable will be based on vendor-specific objective evidence, if available, third-party evidence if vendor-specific objective evidence is not available, or best estimated selling price if neither vendor-specific or third-party evidence is available. A delivered item or items that do not qualify as a separate unit of accounting within the arrangement shall be combined with the other applicable undelivered items within the arrangement. The allocation of arrangement consideration and the recognition of revenue then shall be determined for those combined deliverables as a single unit of accounting. A delivered item or items that do not have stand-alone value to our collaboration partner shall be combined with the other applicable undelivered items within the arrangement.

Each of the deliverables under this arrangement is considered to be a separate unit of accounting. Intellectual property rights revenue is recognized over the period of the research and development obligation. Research funding revenues are recognized as services are performed pursuant to the terms of the agreement. Any amounts received in advance of performance are recorded as deferred revenue. Costs incurred related to the research and development services provided are expensed in the period in which the work is performed.

Research and Development

Research and development expense consists of labor, material, equipment, and allocated facilities costs of the Company's scientific staff who are working pursuant to the Company's collaboration agreement and other research and development projects. Research and development costs are charged to operations as incurred.

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. Advance payments for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses or other long-term assets. The advanced payments are expensed as the related goods are delivered or the services are performed.

Research and Manufacturing Contract Costs and Accruals

The Company has entered into various research and development and manufacturing agreements. These agreements are generally cancelable, and related payments are recorded as the corresponding expenses are incurred. The Company records accruals for estimated costs incurred to date. When evaluating the adequacy of the accrued liabilities, the Company analyzes progress of the research studies or clinical trials and manufacturing activities, including the phase or completion of events, invoices received and contracted costs. Significant judgments and estimates are made in determining the accrued balances at the end of any reporting period. Actual results could differ from the Company's estimates. The Company's historical accrual estimates have not been materially different from the actual costs.

Patent Costs

All patent-related costs incurred in connection with filing and prosecuting patent applications are expensed as incurred due to the uncertainty about the recovery of the expenditure. Amounts incurred are classified as general and administrative expenses.

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Stock-Based Compensation

Equity awards to employees are measured and recognized in the consolidated financial statements based on the fair value of the award on the grant date. The Company currently uses the Black-Scholes valuation model to estimate the grant date fair value of their share-based payments. The model requires the Company to make a number of assumptions including expected volatility, risk-free interest rate, expected term and expected dividend. Stock-based compensation expense is recognized straight-line over the term of the option grant. All option grants require continued service to continue vesting. Forfeitures are recognized as they occur.

The Company recognizes the fair value of stock options granted to non-employees as stock-based compensation expense over the period in which the related services are received. Stock-based compensation expense related to stock options granted to non-employees is recognized based on the vesting date fair value of awards as the stock options are earned. The Company believes that the estimated fair value of stock options is more readily measurable than the fair value of the services rendered.

Comprehensive Loss

Comprehensive loss includes net loss as well as other changes in stockholders' equity (deficit) that result from transactions and economic events other than those with stockholders. For the years ended December 31, 2016 and 2017, there was no difference between net loss and comprehensive loss in the accompanying consolidated financial statements.

Net Income (Loss) Per Share

The Company follows the two-class method when computing net income (loss) per share, as the Company has issued shares that meet the definition of participating securities. The two-class method determines net income (loss) per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities, which include the Company's Series A and Series A-1 convertible preferred stock, based upon their respective rights to receive dividends as if all income for the period had been distributed.

Basic net income (loss) per share attributable to common stockholders is computed by dividing the net income (loss) attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period. Diluted net income (loss) attributable to common stockholders is computed by adjusting net income (loss) attributable to common stockholders to reallocate undistributed earnings based on the potential impact of dilutive securities. Diluted net income (loss) per share attributable to common stockholders is computed by dividing the diluted net income (loss) attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period, including potential dilutive common shares assuming the dilutive effect of common stock equivalents.

The Company's convertible preferred stock contractually entitles the holders of such shares to participate in distributions 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 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 common shares 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.

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Unaudited Pro Forma Net Loss Per Share

Upon the closing of an IPO with proceeds over $50.0 million, all currently outstanding shares of convertible preferred stock will automatically convert into shares of common stock.

Pro forma basic and diluted net loss per share has been computed to give effect to the conversion of the shares of the Company's convertible preferred stock into common stock as if such conversion had occurred at the beginning of the period or the date of original issuance. The pro forma net loss per share does not include the shares of common stock expected to be sold and related proceeds to be received from an IPO.

Income Taxes

Deferred tax assets/liabilities are determined based on the difference between the financial statement carrying amounts and their respective tax bases, as well as net operating losses and credit carry forwards applied by the enacted tax rates expected to be in effect for the year in which the differences are expected to reverse. Changes in deferred tax assets and liabilities are recorded in the provision for income taxes. 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.

The Company accounts for uncertainty in income taxes recognized in the consolidated financial statements by applying a two-step process to determine the amount of tax benefit to be recognized. First, the tax position must be evaluated to determine the likelihood that it will be sustained upon external examination by the taxing authorities. If the tax position is deemed more-likely-than-not to be sustained, the tax position is then assessed to determine the amount of benefit to recognize in the consolidated financial statements. The amount of the benefit that may be recognized is the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. The provision for income taxes includes the effects of any resulting tax reserves, or unrecognized tax benefits, that are considered appropriate as well as the related net interest and penalties.

Emerging Growth Company Status

The Company is an emerging growth company, as defined in the Jumpstart Our Business Startups Act of 2012 (the "JOBS Act"). Under the JOBS Act, emerging growth companies can delay adopting new or revised accounting standards issued subsequent to the enactment of the JOBS Act until such time as those standards apply to private companies. The Company has elected to use this extended transition period for complying with new or revised accounting standards that have different effective dates for public and private companies until the earlier of the date that it (i) is no longer an emerging growth company or (ii) affirmatively and irrevocably opts out of the extended transition period provided in the JOBS Act. As a result, these consolidated financial statements may not be comparable to companies that comply with the new or revised accounting pronouncements as of public company effective dates.

Recently Adopted Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board ("FASB") issued ASU 2014-09, *Revenue from Contracts with Customers (Topic 606).* ASU 2014-9 is a comprehensive new revenue recognition model that requires a company to recognize revenue to depict the transfer of goods or services to a customer at an amount that reflects the consideration it expects to receive in exchange for those goods or services. In August 2015, the FASB issued ASU 2015-14, *Revenue from Contracts with Customers Deferral of Effective Date*. The amendments in this update defer the original effective date of ASU 2014-09 for all entities by one year. For

public entities, the guidance is effective for annual reporting periods beginning after December 15, 2017 and for interim periods within those fiscal years. For nonpublic entities, the guidance is effective for annual reporting periods beginning after December 15, 2018. Early adoption is permitted for all entities. The Company expects to adopt this guidance for the annual reporting period beginning January 1, 2018 using the modified retrospective approach.

In August 2014, the FASB issued ASU 2014-15, *Presentation of Financial Statements—Going Concern (Subtopic 205-40).* ASU 2014-15 requires management to assess an entity's ability to continue as a going concern by incorporating and expanding upon certain principles that are currently in U.S. auditing standards. Specifically, the amendments (1) provide a definition of the term substantial doubt, (2) require an evaluation every reporting period, including interim periods, (3) provide principles for considering the mitigating effect of management's plans, (4) require certain disclosures when substantial doubt is alleviated as a result of consideration of management's plans, (5) require an express statement and other disclosures when substantial doubt is not alleviated, and (6) require an assessment for a period of one year after the date that the financial statements are issued (or available to be issued). The Company adopted this standard on January 1, 2017.

In September 2015, the FASB issued ASU No. 2015-16, *Business Combinations (Topic 805): Simplifying the Accounting for Measurement-Period Adjustments (Topic 805).* ASU 2015-16 requires that an acquirer recognize adjustments to provisional amounts that are identified during the measurement period in the reporting period in which the adjustment amounts are determined and sets forth new disclosure requirements related to the adjustments. The Company adopted this standard on January 1, 2017, however, there was no impact on the Company's financial position or results of operations.

In November 2015, the FASB issued ASU No. 2015-17, *Balance Sheet Classification of Deferred Taxes*. ASU 2015-17 requires all companies to prospectively classify all deferred tax assets and liabilities as noncurrent on the balance sheet. The new standard was effective for the Company on January 1, 2018. However, early adoption is permitted. The Company early adopted this standard on January 1, 2016, however, there was no impact to the Company's consolidated balance sheets.

In August 2016, the FASB issued ASU 2016-15, *Statement of Cash Flows (Topic 230), Classification of Certain Cash Receipts and Cash Payments*. The guidance addresses the presentation and classification of certain cash receipts and cash payments in the statement of cash flows under Topic 230, including the classification of cash flows related to debt prepayment or extinguishment costs, contingent consideration payments made after a business combination and other key transactions. The guidance also clarifies how the predominance principle should be applied when cash receipts and cash payments have aspects of more than one class of cash flows For public entities, the guidance is effective for the annual reporting period beginning January 1, 2018 and for the interim periods within those fiscal years. For non-public entities, the guidance is effective for the annual reporting period beginning January 1, 2019 and early adoption is permitted. The Company has early adopted this standard on January 1, 2017, which resulted in the presentation of the deferred payment to the former stockholders of Vindico within the financing section of the statement of cash flows.

In March 2016, the FASB issued ASU 2016-09, *Improvements to Employee Share-Based Payment Accounting (Topic 718)*, which simplifies share-based payment accounting through a variety of amendments, including tax treatment for stock-based compensation and associated disclosures. The Company adopted the standard on January 1, 2016 and it did not have a material impact on the financial statements.

In January 2017, the FASB issued ASU 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Business*. ASU 2017-01 clarifies the framework for determining whether an integrated set of assets and activities meets the definition of a business. The revised framework establishes a screen for determining whether an integrated set of assets and activities is a business and narrows the definition of a

business. The screen requires that when substantially all of the fair value of the gross assets acquired (or disposed of) is concentrated in a single identifiable asset or a group of similar identifiable assets, the set is not a business. This screen reduces the number of transactions that need to be further evaluated. This new accounting guidance is effective for public or private companies for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years. Early adoption is permitted. The new accounting guidance should be applied prospectively on or after the effective date. The Company adopted this guidance on January 1, 2017.

In May 2017, the FASB issued ASU 2017-09, *Compensation-Stock Compensation (Topic 718): Scope of Modification Accounting*, which clarifies when a change to terms or conditions of a share-based payment award must be accounted for as a modification. The new guidance requires modification accounting if the vesting condition, fair value or the award classification is not the same both before and after a change to the terms and conditions of the award. The new guidance is effective on a prospective basis beginning on January 1, 2018 and early adoption is permitted. The Company expects to adopt this standard on January 1, 2018, however, it does not expect it to have a material impact on its consolidated financial statements.

Recently Issued Accounting Pronouncements

In February 2016, the FASB issued ASU 2016-02, *Leases.* ASU 2016-02 provides revised guidance related to the accounting and reporting of leases, including a requirement for lessees to recognize most leases on the balance sheet. The recognition, measurement and presentation of expenses and cash flows arising from a lease by a lessee will depend on its classification as a finance or operating lease. For public entities, the guidance is effective for the annual reporting period beginning January 1, 2019 and for the interim periods within those fiscal years. For non-public entities, the guidance is effective for the annual reporting period beginning January 1, 2020. Companies must use a modified retrospective transition, with a number of practical expedients that entities may elect to apply. Early adoption is permitted. While management is currently assessing the impact this update will have to the Company's consolidated financial statements, the expected primary impact to its consolidated financial position upon adoption will be the recognition, on a discounted basis, of its minimum commitments under noncancelable operating leases on its consolidated balance sheets resulting in the recording of right of use assets and lease liabilities. Our current minimum commitments under noncancelable operating leases are disclosed in Note 13.

NOTE 3—COMPOSITION OF CERTAIN BALANCE SHEET COMPONENTS

Property and Equipment, Net

Property and equipment, net consist of the following as of (in thousands):

	December 31,	
	2016	2017
Lab equipment	$1,350	$1,559
Leasehold improvements	534	536
Computer equipment and software	99	111
Furniture and fixtures	65	65
Construction in progress	8	4
	2,056	2,276
Less: Accumulated depreciation and amortization	(164)	(550)
Total property and equipment, net	$1,892	$1,725

Depreciation expense associated with property and equipment was $0.1 million and $0.4 million for the years ended December 31, 2016 and 2017, respectively.

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Goodwill and Other Intangible Assets

Goodwill and other intangible assets consist of the following as of (in thousands):

	December 31, 2016	December 31, 2017
Goodwill	$4,228	$4,228
Indefinite lived intangible assets		
IPR&D	$2,380	$2,380
Definite lived intangible assets		
Non-compete agreements	580	580
Less: accumulated amortization	(68)	(356)
Total intangible assets, net	$2,892	$2,604

Amortization expense of acquired intangible assets was $0.1 million and $0.3 million for the years ended December 31, 2016 and 2017, respectively. The remaining balance of $0.2 million as of December 31, 2017 is expected to be fully amortized during the year ending December 31, 2018.

Other Long-Term Assets

Other long-term assets consist of the following as of (in thousands):

	December 31, 2016	December 31, 2017
Contract research services	$ —	$1,007
Security deposit	63	63
Total other long-term assets	$ 63	$1,070

Accrued and Other Liabilities

Accrued and other liabilities consist of the following as of (in thousands):

	December 31, 2016	December 31, 2017
Payroll and related expenses	$ 887	$1,392
Contract research services	554	906
Professional fees	146	140
Payable to former Vindico stockholders (see Note 6)	596	—
Other	179	46
Total accrued and other liabilities	$2,362	$2,484

NOTE 4—FAIR VALUE MEASUREMENT

Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants as of the measurement date. Applicable accounting guidance provides an established hierarchy for inputs used in measuring fair value that maximizes the use of observable inputs and minimizes the

use of unobservable inputs by requiring that the most observable inputs be used when available. Observable inputs are inputs that market participants would use in valuing the asset or liability and are developed based on market data obtained from sources independent of the Company. Unobservable inputs are inputs that reflect the Company's assumptions about the factors that market participants would use in valuing the asset or liability. There are three levels of inputs that may be used to measure fair value:

- Level 1: Unadjusted quoted prices in active markets that are accessible at the measurement date for identical, unrestricted assets or liabilities
- Level 2: Observable market based inputs or unobservable inputs that are corroborated by market data
- Level 3: Unobservable inputs supported by little or no market activity.

The Company has classified assets and liabilities measured at fair value on a recurring basis as follows (in thousands):

	Level 1	Level 2	Level 3
At December 31, 2016:			
Contingent Consideration	$ —	$ —	$4,410
At December 31, 2017:			
Contingent Consideration	$ —	$ —	$2,485
Warrant Liability	—	—	275
Total	$ —	$ —	$2,760

In connection with the Vindico acquisition (see Note 6), the Company agreed to pay additional purchase consideration, based on the achievement of a certain developmental milestone using the acquired technology by October 2018. The additional purchase consideration is payable in shares of the Company's common stock. This contingent consideration is measured at fair value and is based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The value of contingent consideration uses assumptions the Company believes would be made by a market participant. The Company estimates the fair value of contingent consideration on an on-going basis as additional data impacting the assumptions is obtained.

Contingent consideration may change significantly as development progresses and additional data is obtained, impacting the Company's assumptions regarding probabilities of successful achievement of the milestone and timing in which it is expected to be achieved. In evaluating the fair value information, judgment is required to interpret the market data used to develop the estimates. The estimates of fair value may not be indicative of the amounts that could be realized in a current market exchange. Accordingly, the use of different market assumptions and/or different valuation techniques could result in materially different fair value estimates.

The significant unobservable inputs used in the measurement of fair value of the Company's contingent consideration are probabilities of successful achievement of the milestone, number of shares to be issued and the valuation of the Company's common stock. Significant increases or decreases in the probability of success would result in a significantly higher or lower fair value measurement, respectively. Significant increases or decreases in the estimated valuation of common stock would result in a significantly higher or lower fair value measurement, respectively. As of December 31, 2016, the fair value of the common stock was determined with a probability of success of 75%. During 2017, the probability of successfully achieving the milestone by the end of the contingency period was reduced to 50%. This reduction in probability was offset by other factors which caused the fair value of the common stock to remain relatively consistent at $1.55. The estimated number of shares issuable was 2.9 million and 3.2 million, as of December 31, 2016 and 2017, respectively.

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The Companies classifies this contingent consideration as a liability on its consolidated balance sheets that it remeasures to fair value at each reporting date, and the Company recognizes changes in the fair value of the contingent consideration liability as a component of operating income (loss) in its consolidated statements of operations. The Company will continue to recognize changes in the fair value of the contingent consideration liability until the milestone is met or the milestone period has expired (see Note 14).

The preferred stock warrant liability in the table above consisted of the fair value of warrants to purchase Series A-1 convertible preferred stock ("Series A-1 Preferred Stock") (see Note 10) and was based on significant inputs not observable in the market, which represent a Level 3 measurement within the fair value hierarchy. The Company's valuation of the preferred stock warrants utilized the Black-Scholes option-pricing model, which incorporates assumptions and estimates to value the preferred stock warrants.

The quantitative elements associated with the Company's Level 3 inputs impacting the fair value measurement of the preferred stock warrant liability include the fair value per share of the underlying Series A-1 Preferred Stock, the remaining contractual term of the warrants, risk-free interest rate, expected dividend yield and expected volatility of the price of the underlying preferred stock. The most significant assumption in the Black-Scholes option-pricing model impacting the fair value of the preferred stock warrants is the fair value of the Company's convertible preferred stock as of each remeasurement date. The Company determines the fair value per share of the underlying preferred stock by taking into consideration its most recent sales of its convertible preferred stock as well as additional factors that the Company deems relevant. As of December 31, 2017, the fair value of the Series A-1 Preferred Stock was $3.06 per share. The Company historically has been a private company and lacks company-specific historical and implied volatility information of its stock. Therefore, it estimates its expected stock volatility based on the historical volatility of publicly traded peer companies for a term equal to the remaining contractual term of the warrants. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve for time periods approximately equal to the remaining contractual term of the warrants. The Company has estimated a 0% dividend yield based on the expected dividend yield and the fact that the Company has never paid or declared dividends.

The Company classifies these warrants as a liability on its consolidated balance sheets that it remeasures to fair value at each reporting date, and the Company recognizes changes in the fair value of the warrant liability as a component of other income (expense) in its consolidated statements of operations. The Company will continue to recognize changes in the fair value of the warrant liability until the warrants are exercised, expire or qualify for equity classification.

A reconciliation of the level 3 financial instruments as of December 31, 2017 is as follows (in thousands):

Fair value of level 3 financial instruments as of December 31, 2016	$ 4,410
Issuance of warrants to purchase shares of Series A-1 convertible preferred stock	275
Change in fair value of contingent consideration	(1,925)
Fair value at December 31, 2017	$ 2,760

NOTE 5—COLLABORATION AGREEMENT

In November 2014, Transposagen entered into a research collaboration agreement and license agreement with Janssen. Under the agreement, Janssen has exclusive rights to any allogeneic CAR-T therapy that is jointly developed by Transposagen and Janssen. In addition, Janssen received a non-exclusive research license to utilize Transposagen's proprietary gene editing technologies for gene and cell therapy solutions for treating diseases with significant unmet medical need. Janssen paid Transposagen an upfront cash payment of $15.0 million and

was obligated to provide research plan funding over the three-year agreement. In addition, Transposagen has the potential to receive additional developmental milestone and royalties from future sales for products developed within this agreement. As part of the Separation, Poseida assumed the agreement with Janssen. Although the upfront payment was not transferred to Poseida, upon assumption of the contract, Poseida recorded deferred revenue for the amount received by Transposagen and recognizes the associated revenue over the term of the agreement. In November 2016 the Company received notice from Janssen that the collaboration agreement would be terminated as of January 28, 2017. Upon receiving notice from Janssen, the Company prospectively adjusted the agreement term to January 28, 2017 and recognized the remaining deferred revenue balance as revenue on a straight line basis over that period. Deferred revenue of $2.7 million related to this amount was recorded on the Company's consolidated balance sheet as of December 31, 2016. During the year ended December 31, 2016 the Company recognized revenue of $7.3 million and $2.5 million, related to the upfront payment and research funding, respectively. During the year ended December 31, 2017 the Company recognized revenue of $2.7 million and $0.3 million, related to the upfront payment and research funding, respectively.

NOTE 6—ACQUISITION OF VINDICO

On October 10, 2016, the Company completed the acquisition of all the outstanding ownership interests in Vindico. The Company paid $1.1 million in cash and issued an aggregate of 436,514 shares of common stock to the selling stockholders at closing. The Company issued an additional 601 shares of common stock during 2018 in connection with the Vindico acquisition as a result of the timing of document submission by certain selling stockholders. The common stock was valued at $0.7 million based on the fair value of the Company's stock at October 10, 2016 or $1.51 per share. Additional consideration in the form of a cash payment was due in 2017, in the amount $0.6 million. This payment was not contingent on the occurrence of future events.

The Company also agreed to pay an additional amount of up to 3.2 million shares in common stock, based on the achievement of a certain developmental milestone. The fair value of this contingent consideration was estimated to be $4.4 million at the date of acquisition, based on the then expected number of shares issuable and a common stock fair value of $1.51 per share, which incorporated a probability of successfully meeting the milestone of 75%. The number of shares issued and associated fair value could vary based on when and if the milestone is reached.

The elements of the purchase consideration were as follows (in thousands):

	Purchase Price
Cash paid at closing	$ 1,050
Fair value of common stock issued	659
Fair value of contingent consideration (see Note 4)	4,410
Deferred purchase consideration payments	592
Total	$ 6,711

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The Company accounted for the Vindico acquisition using the acquisition method of accounting. The acquisition method of accounting requires, among other things, that the assets acquired and liabilities assumed in a business combination be measured at their fair values as of the closing date of the acquisition. The allocation of the purchase price is based on estimates of the fair value of assets acquired and liabilities assumed as of the acquisition date. The components of the purchase price allocation are as follows (in thousands):

	Allocation
Net working capital and assets assumed	$ 475
Deferred tax liabilities	(952)
IPR&D	2,380
Non-compete agreements	580
Goodwill	4,228
Total	$ 6,711

Intangible assets were valued using the multiple period excess earnings and replacement cost approach for IPR&D and using the with-and-without method for non-compete agreements. IPR&D is classified as indefinite-lived assets until they become definite lived assets upon the successful completion or the abandonment of the associated research and development effort. Accordingly, during the development period after the date of acquisition, these assets will not be amortized until the acquired technology is accepted by the Food and Drug Administration as part of an Investigation New Drug application. At that time, the Company will determine the useful life of the asset and begin amortization. If the associated research and development effort is abandoned, the related in-process research and development assets will be written-off and an impairment charge recorded. Significant assumptions were used to determine the value of the IPR&D including estimated future cash flow, costs to develop the technology, probability of success and discount rates.

The excess of the purchase price over the estimated fair value of the tangible net assets and identifiable intangible assets acquired was recorded as goodwill. The factors contributing to the recognition of the amount of goodwill are based on several strategic and synergistic benefits that are expected to be realized from the Vindico acquisition. The acquisition of Vindico is intended to provide the Company access to nanoparticle technology to use as a delivery method for its existing technology.

NOTE 7—TERM DEBT

On July 25, 2017, the Company entered into a loan and security agreement (the “Loan Agreement”) with Oxford Finance LLC (“Oxford”), pursuant to which Oxford agreed to lend the Company up to $15.0 million, issuable in two separate term loans of $10.0 million (the “Term A Loan”) and $5.0 million (the “Term B Loan”), (collectively referred to the as the “Term Loans”). On July 25, 2017, the Company received $10.0 million in proceeds from the Term A Loan, net of debt issuance costs of $0.2 million. Under the terms of the Loan Agreement the Company may, at its sole discretion, borrow $5.0 million under the Term B Loan following the achievement of a defined milestone event until the earlier of 60 days thereafter or June 30, 2018.

All outstanding Term Loans will mature on August 1, 2021 (the “Maturity Date”) and will have interest-only payments through September 1, 2018, followed by 36 equal monthly payments of principal and unpaid accrued interest. The Term Loans will bear interest at a floating per annum rate equal to (i) 6.96% plus (ii) the greater of (a) the 30 day U.S. Dollar LIBOR rate reported in The Wall Street Journal on the last business day of the month that immediately precedes the month in which the interest will accrue and (b) 0.99%. The interest rate as of December 31, 2017 was 8.34%. The Company will be required to make a final payment of 8.5% of the principal balance outstanding, payable on the earlier of (i) the Maturity Date, (ii) acceleration of any Term Loan, or (iii) the prepayment of the Term Loans.

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There is an option to prepay all, but not less than all, of the borrowed amounts, provided that the Company will be obligated to pay a prepayment fee equal to (i) 3.0% of the outstanding principal balance of the applicable Term Loan if prepayment is made after July 25, 2017 (the "Funding Date") through and including the first anniversary of the Funding Date (ii) 2.0% of the outstanding balance after the first anniversary through and including the second anniversary of the Funding Date of the Term Loan or (iii) 1.0% of the applicable Term Loan prepaid after the second anniversary of the Funding Date and prior to the Maturity Date.

The Company may use the proceeds from the Term Loans solely for working capital and to fund its general business requirements. The Company's obligations under the Loan Agreement are secured by a first priority security interest in substantially all of its current and future assets, other than our intellectual property. In addition, the Company has also agreed not to encumber its intellectual property assets, except as permitted by the Loan Agreement. While any amounts are outstanding under the Loan Agreement, the Company is subject to a number of affirmative and restrictive covenants, including covenants regarding dispositions of property, business combinations or acquisitions, among other customary covenants. The Company is also restricted from paying dividends or making other distributions or payments on its capital stock in excess of $0.3 million, on an annual basis, subject to limited exceptions. As of December 31, 2017, the Company was in compliance with all covenants under the Loan Agreement.

Pursuant to the Loan Agreement, on July 25, 2017, the Company issued to Oxford warrants to purchase an aggregate of up to 116,618 shares of the Company's Series A-1 Preferred Stock at an exercise price of $3.43 per share. If the Company borrows additional amounts under the Loan Agreement, it will, in connection with any such borrowing, issue Oxford warrants to purchase that number of shares of the Company's Series A-1 Preferred Stock as is equal to 4.0% of the additional principal amount borrowed divided by the exercise price. The warrants were immediately exercisable and will expire ten years from the date of the grant. The fair value of $0.3 million of the warrants was derived using the Black-Scholes pricing model utilizing the following inputs: risk-free interest rate—2.3%, volatility—77.8%, dividend yield—0% and expected life in years—10. The fair value of the warrants was treated as a debt discount and as a preferred stock warrant liability (see Note 10). The debt discount is amortized over the term of the loan to interest expense.

As of December 31, 2017, there was $10.0 million outstanding under the Term A Loan. The Term A Loan was recorded at its initial carrying value of $10.0 million, less unamortized debt issuance costs of approximately $0.2 million. In connection with the Term A Loan, the debt issuance costs have been recorded as a debt discount on the Company's consolidated balance sheets, which are being accreted to interest expense over the life of the Term A Loan. Interest on the term loan, consisting of the stated interest rate, final payment fee and amortization of the discount, is being recognized under the effective interest method using a rate of 13.6%.

As of December 31, 2017, the estimated future principal payments for the Term A Loan due under the Loan Agreement are as follows (in thousands):

2018	$ 1,111
2019	3,333
2020	3,333
2021	2,223
Total future principal payments	$10,000

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NOTE 8—RELATED PARTY TRANSACTIONS

Poseida's related parties include directors and officers of the Company, as well as Transposagen and Hera (see Note 1). During the year ended December 31, 2016 the Company purchased reagents and other research and development related materials from Transposagen and Hera amounting to $0.1 million of expense.

The acquisition of Vindico was deemed a related party transaction. The Company's Chief Executive Officer was also formerly Chief Executive Officer of Vindico as well as a greater than 10% shareholder in both entities. Holders of 53% of the Company's shares prior to acquisition also held 62% ownership of Vindico shares. However, the Company determined those shareholders did not constitute a control group and that common control between the Company and Vindico did not exist at the time of the acquisition. As a result, the Company accounted for the Vindico acquisition using the acquisition method of accounting (see Note 6). As a result of his former ownership of Vindico's capital stock, the Company's Chief Executive Officer received $579,674 and 179,461 shares of the Company's common stock in connection with the acquisition and would be entitled to receive up to 41.0% of the total milestone contingent consideration receivable by former stockholders of Vindico if the milestone is achieved.

NOTE 9—CONVERTIBLE PREFERRED STOCK

As of December 31, 2017, Preferred Stock consisted of the following (in thousands, except share amounts):

	Preferred Stock Authorized	Preferred Stock Issued and Outstanding	Carrying Value	Liquidation Preference	Common Stock Issuable Upon Conversion
Series A Preferred Stock	9,696,798	9,696,798	$31,063	$ 31,063	9,696,798
Series A-1 Preferred Stock	4,373,178	3,253,645	11,083	11,083	3,253,645
	14,069,976	12,950,443	$42,146	$ 42,146	12,950,443

The Company has issued Series A convertible preferred stock (the "Series A Preferred Stock") and Series A-1 Preferred Stock. The Series A Preferred Stock and the Series A-1 Preferred Stock are collectively referred to as the "Preferred Stock."

In December 2015, the Company issued 6,781,346 shares of Series A Preferred Stock with a stated value of $3.43 per share. The cash proceeds for the Series A Preferred Stock was $19.8 million, net of issuance costs of $0.4 million. There were outstanding convertible notes that were also converted in the Series A Preferred Stock financing.

Additionally, the Company and its lead investor agreed to issue an additional 2,915,452 shares of Series A Preferred Stock ("Milestone shares") on the same terms as the original shares issued under the Series A Preferred Stock financing, including a per share purchase price of $3.43, pursuant to specific operational milestone events occurring between May 15, 2016 and October 30, 2016.

In August 2016, subsequent to completion of specified milestones, the Company issued the Milestone shares with a stated value of $3.43 per share. The cash proceeds for Milestone shares was $8.2 million, net of issuance costs of $1.7 million. The commitment to issue additional Preferred Stock was accounted for as a contingent forward contract, which initially had no fair value. Based on subsequent changes in the fair value of the Preferred Stock, an asset of $0.1 million was recognized with a related gain within other income (expense), net in the Company's consolidated statement of operations. On the issuance of the preferred stock the contingent forward asset was recorded against the carrying amount of the Preferred Stock.

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In July 2017, the Company issued 3,253,645 shares of Series A-1 Preferred Stock with a stated value of $3.43 per share. The cash proceeds for the Series A-1 Preferred Stock was $11.1 million, net of issuance costs of $0.1 million.

The rights, preferences and privileges of the Preferred Stock are as follows:

Dividends

The holders of the outstanding shares of Preferred Stock are entitled to receive dividends, when and if declared by the Board of Directors. Such dividends are payable in preference to any dividends for common stock declared by the Board of Directors. As of December 31, 2017, no dividends have been declared.

Conversion

Each share of Preferred Stock is convertible at any time, at the option of the holder, into an equal number of fully paid shares of common stock. The conversion price is subject to adjustment for recapitalization (i.e. stock dividend, stock split, combination of shares, reorganization, recapitalization, reclassification or other similar event).

Each share of convertible Preferred Stock automatically converts into common stock at the effective conversion rate upon the closing of an initial public offering in which the public offering gross proceeds exceed $50.0 million, or upon the affirmative vote by holders of the majority of the outstanding Preferred Stock.

Liquidation

In the event of any voluntary or involuntary liquidation, dissolution or winding-up of the Company or Deemed Liquidation Event (as described below), the holders of the Preferred Stock shall be entitled to receive, prior and in preference to any distribution of any of the assets of the Company to the holders of the common stock an amount equal to the greater of (i) the applicable Preferred Stock original issue price, plus any dividend declared but unpaid, or (ii) the amount per share that would have been payable had all shares of Preferred Stock been converted into common stock immediately prior to such Deemed Liquidation Event.

Unless the holders of the majority of the then-outstanding shares of Preferred Stock, voting together as a single class on an as-converted basis, elect otherwise, a Deemed Liquidation Event shall include a merger or consolidation (other than one in which stockholders of the Company own a majority by voting power of the outstanding shares of the surviving or acquiring corporation) or a sale, lease, transfer, exclusive license or other disposition of all or substantially all of the assets of the Company.

If upon the liquidation, dissolution or winding up of the Company, the assets of the Company legally available for distribution to the holders of the Preferred Stock are insufficient to permit the payment to such holders of the full amounts, then the entire assets of the corporation legally available for distribution shall be distributed with equal priority and pro rata among the holders of the Preferred Stock in proportion to the full amounts they would otherwise be entitled to receive.

After the payment or setting aside for payment to the holders of Preferred Stock of the full amounts specified above, the entire remaining assets of the Company legally available for distribution shall be distributed with equal priority and pro rata among the holders of the Preferred Stock and common stock.

As the Company’s amended and restated certificate of incorporation contains a provision that upon a change of control of the Company the Preferred Stock is redeemable at the holder’s option, the Preferred Stock have been classified outside of stockholders’ deficit in the Company’s consolidated balance sheets.

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Voting

The holder of each share of Preferred Stock is entitled to the number of votes equal to the number of shares of common stock into which such holder's shares of Preferred Stock can be converted.

NOTE 10—WARRANTS TO PURCHASE PREFERRED STOCK

In July 2017, the Company issued warrants to purchase up to 116,618 shares of Series A-1 Preferred Stock in connection with the Loan Agreement (see Note 7). The warrants are exercisable at a price of $3.43 per share and have a contractual term of ten years from issuance. The fair value of the warrants on the issuance date of $0.3 million was recorded as a debt discount and as a preferred stock warrant liability in the Company's consolidated balance sheets.

The Company remeasures the fair value of the liability for these preferred stock warrants at each reporting date and records any adjustments as other income (expense). The warrants outstanding at each reporting date were remeasured using the Black-Scholes option-pricing model, and the resulting change in fair value was recorded in other income (expense) in the Company's consolidated statements of operations. For the year ended December 31, 2017, there was no change in fair value of these preferred stock warrants.

NOTE 11—COMMON STOCK

The Company's amended and restated certificate of incorporation authorizes the Company to issue 36,000,000 shares of $0.0001 par value common stock. Each share of common stock is entitled to one vote. The holders of common stock are also entitled to receive dividends whenever funds are legally available and when declared by the Board of Directors, subject to the prior rights of holders of all classes of Preferred Stock outstanding. Since the Company's inception, there have been no dividends declared.

NOTE 12—STOCK OPTION PLAN

The Company provides for the granting of stock options to employees, directors, and consultants under the 2015 Equity Incentive Plan, as amended ("the 2015 Plan"). As of December 31, 2017, 5,454,710 shares were authorized to be issued under the 2015 Plan. Options granted under the 2015 Plan may be incentive stock options ("ISOs"), nonstatutory stock options ("NSOs") Stock Appreciation Rights ("SARs"), Restricted Stock Awards ("RSAs)" or Restricted Stock Unit Awards ("RSUs"). As of December 31, 2017, there was 1,206,533 shares available for future option grants or direct issuance under the 2015 Plan. To date, the Company has issued ISOs and NSOs. Shares issued under the 2015 Plan are newly issued shares and there is no intention to repurchase previously issued shares. The exercise price of options granted under the 2015 Plan cannot be less than 100% of the fair value of the common stock. The term and vesting period of each option shall be stated in the underlying agreements. However, the term shall be no more than ten years from the date of grant and vesting period shall be generally over four years. In the case of an ISO granted to an optionee who, at the time the option is granted, owns stock representing more than ten percent of the voting power of all classes of stock of the Company, the term of the option shall be five years from the date of grant and issued at 110% of the fair value at the date of grant.

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Following is a summary of the Company's stock option plan activity and related information:

	Shares	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (Years)	Intrinsic Value (Thousands)
Balance at January 1, 2017	2,758,002	$ 0.59	8.51	
Options Granted	387,850	1.51		
Exercised	(873,156)	0.42		
Cancelled	(220,042)	0.76		
Balance at December 31, 2017	2,052,654	$ 0.82	8.02	$ 1,496
Options Vested and Expected to Vest as of December 31, 2017	2,052,654	0.82	8.02	$ 1,496
Options Exercisable as of December 31, 2017	635,297	$ 0.59	7.70	$ 610

The aggregate intrinsic value of options exercised during the years ended December 31, 2016 and 2017 was $0.8 million and $0.9 million, respectively, determined as of the date of exercise. The Company received $0.4 million in cash from options exercised during each of the years ended December 31, 2016 and 2017.

The Company recorded stock-based compensation expense in the following expense categories of its consolidated statements of operations (in thousands):

	Year Ended December 31,	
	2016	2017
Research and development	$ 64	$ 128
General and administrative	239	272
Total stock-based compensation	$ 303	$ 400

The weighted-average fair value of options granted during the years ended December 31, 2016 and 2017 was $0.67 and $1.05 per share, respectively. As of December 31, 2017, total unrecognized compensation cost related to stock options was $0.9 million, and the weighted-average period over which this cost is expected to be recognized is approximately 2.7 years. Total fair value of shares vested during the years ended December 31, 2016 and 2017 was $0.3 million and $0.4 million, respectively.

The assumptions that the Company used to determine the fair value of options granted to employees, non-employees and directors were as follows:

	Year Ended December 31,	
	2016	2017
Expected volatility	81%-97%	80%-82%
Risk-free interest rate	1.22%-2.13%	1.92%-2.25%
Expected term (years)	5-6	5.8-6
Expected dividend	—	—

Expected volatility—Since the Company has been a privately held company and does not have any trading history for its common stock, the expected volatility is estimated based on the average volatility for comparable publicly traded biotechnology companies over a period equal to the expected term of the stock option grants. The comparable companies were chosen based on their similar size, stage in the life cycle or area of specialty. The

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Company will continue to apply this process until a sufficient amount of historical information regarding the volatility of its own stock price becomes available.

Risk-free interest rate—The risk-free interest rate is based on the U.S. Treasury zero coupon issues in effect at the time of grant for periods corresponding with the expected term of option.

Expected term—The expected term represents the period that stock-based awards are expected to be outstanding. The expected term for option grants is determined using the simplified method. The simplified method deems the expected term to be the midpoint between the vesting date and the contractual life of the stock-based awards.

Expected dividend—The Company has never paid dividends on its common stock and has no plans to pay dividends on its common stock. Therefore, the Company used an expected dividend yield of zero.

NOTE 13—COMMITMENTS AND CONTINGENCIES

Operating Leases

In March 2016, the Company entered into a lease agreement for a facility in San Diego, California to be used for research and development and administrative activities. The lease commenced on June 30, 2016 and has a 10.5-year initial term. The lease also provides for rent abatements and scheduled increases in base rent. In connection with the lease, the Company made a one-time cash security deposit in the amount of $0.1 million, included in other long-term assets in the Company's consolidated balance sheet. The Company also leases other short-term lab and office space in Lexington, Kentucky, this lease agreement expired in 2018. Total rent expense for each of the years ended December 31, 2016 and 2017 was $0.8 million.

Future annual minimum lease payments at December 31, 2017 were as follows (in thousands):

Year Ending December 31,	
2018	$ 765
2019	785
2020	807
2021	828
2022	852
Thereafter	3,670
Total future minimum lease payments	$7,707

License Agreement with Janssen Biotech Inc.

On August 3, 2015, the Company entered into a license agreement ("Janssen Agreement") with Janssen pursuant to which the Company obtained exclusive worldwide rights to research, develop, manufacture and commercialize pharmaceutical products comprising autologous T-cells or any natural killer (NK) or NK-like cells expressing certain Centyrin molecules or Centyrin CAR molecules for the treatment or prevention of any disease in humans. Pursuant to the Janssen Agreement, we paid Janssen an upfront fee of $0.2 million. The Company is required to pay Janssen up to an aggregate of $75.8 million upon the achievement of certain clinical, regulatory and sales milestones for the first licensed product and up to an aggregate of $46.8 million upon the achievement of certain clinical, regulatory and sales milestones for each licensed product thereafter. The Company is also obligated to pay, on a product-by-product and country-by-country basis, royalties in the low single-digit percentage range on annual net sales.

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April 2017 Commercial License Agreement with TeneoBio, Inc.

On April 27, 2017, the Company entered into a commercial license agreement (the "2017 TeneoBio Agreement") with TeneoBio, Inc. ("TeneoBio") pursuant to which the Company obtained exclusive worldwide rights to use and develop pharmaceutical products comprising allogeneic T-cells expressing a CAR molecule containing certain heavy chain sequences provided by TeneoBio.

Pursuant to the 2017 TeneoBio Agreement, the Company has paid TeneoBio $0.5 million through the Company's selection of the antibodies licensed under the 2017 TeneoBio Agreement. The Company is required to pay TeneoBio up to an aggregate of $20.5 million upon the first achievement of certain clinical and regulatory milestones for any allogeneic product and up to an aggregate of $20.5 million upon the first achievement of certain clinical and regulatory milestones for any autologous product. The Company is also obligated to pay, on a product-by-product and country-by-country basis, a royalty in the low single-digit percentage on net sales of any licensed products.

Indemnification Agreements

In the ordinary course of business, the Company may provide indemnification of varying scope and terms to vendors, lessors, contract research organizations, business partners and other parties with respect to certain matters including, but not limited to, losses arising out of breach of such agreements or from intellectual property infringement claims made by third parties. In addition, the Company has entered into indemnification agreements with members of its board of directors and certain of its executive officers that will require the Company, among other things, to indemnify them against certain liabilities that may arise by reason of their status or service as directors or officers. The maximum potential amount of future payments the Company could be required to make under these indemnification agreements is, in many cases, unlimited. The Company has not incurred any material costs as a result of such indemnifications and is not currently aware of any indemnification claims.

Legal Contingencies

In the ordinary course of business, the Company may face claims brought by third parties against the Company. The Company does not believe that there is any litigation, asserted or unasserted claim pending that could, individually or in the aggregate, have a material adverse effect on the Company's results of operations or financial condition.

NOTE 14—INCOME TAXES

The Tax Cuts and Jobs Act (the "Act") was enacted on December 22, 2017 which reduced the U.S. federal corporate tax rate from 35% to 21%. In response to the Act, the Securities and Exchange Commission issued Staff Accounting Bulletin 118 ("SAB 118"), which provides guidance on accounting for the tax effects of the Act. SAB 118 provides a measurement period that should not extend beyond one year from the Act (the Company is to account for the Act under ASC 740, *Income Taxes*). The Act became effective on the date of issuance. The Company recorded provisional adjustments and expects to finalize the provisional amounts within one year from the enactment date. For instance, the Company has made a reasonable estimate of the effects on its existing deferred tax balances and the one-time transition tax. As a result, the Company revalued the net deferred tax assets as of December 31, 2017 to reflect the rate reduction. However, because of the valuation allowance, the Company recorded a provisional estimate of a reduction of the net deferred tax liability of $0.3 million in the year ended December 31, 2017. In all cases, the Company will continue to make and refine its calculations as additional analysis is completed. In addition, the Company's estimates may also be affected as the Company gains a more thorough understanding of the tax law.

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The components of the net loss before income tax for the years ended December 31, 2016 and 2017 are as follows (in thousands):

	December 31, 2016	December 31, 2017
U.S. domestic	$(4,650)	$(19,969)
Foreign	(90)	(220)
Net loss before income tax	$(4,740)	$(20,189)

The benefit from income taxes for the years ended December 31, 2016 and 2017 consist of the following (in thousands):

	December 31, 2016	December 31, 2017
Current:		
Federal	$ —	$ —
State	2	1
Foreign	—	—
Total current provision	2	1
Deferred:		
Federal	—	(282)
State	(167)	(246)
Foreign	—	—
Total deferred benefit	(167)	(528)
Total benefit	$(165)	$(527)

The benefit from income taxes differs from the amount of income tax determined by applying the applicable U.S. statutory federal income tax rate to pretax income as a result of the following differences as of (dollars in thousands):

	December 31, 2016	December 31, 2017
Federal statutory rate	$(1,618)	$(6,864)
Adjustments for tax effects of:		
State taxes, net	76	(1,153)
Permanent adjustments	14	(276)
Stock-based compensation	86	47
Foreign rate differential	4,275	833
Federal rate change impact due to the Act	—	2,415
Tax credits	(664)	(1,299)
Unrecognized tax benefits	158	323
Other, net	(22)	(212)
Change in valuation allowance	(2,470)	5,659
Total	$ (165)	$ (527)

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Significant components of the Company's deferred tax assets and liabilities consist of the following as of (in thousands):

	December 31, 2016	December 31, 2017
Deferred tax assets:		
Deferred revenue	$ 1,084	$ —
Accrued expenses	356	287
Net operating losses	1,554	7,053
Income tax credit carryforwards	475	1,475
Other, net	143	153
Total deferred tax assets	3,612	8,968
Deferred tax liabilities:		
Depreciation and amortization	(572)	(269)
Acquired indefinite lived intangibles	(785)	(257)
Total deferred tax liabilities	(1,358)	(527)
Valuation allowance	(3,040)	(8,699)
Net deferred tax liability	$ (785)	$ (257)

The realization of deferred tax assets may be dependent on the Company's ability to generate sufficient income in future years in the associated jurisdiction to which the deferred tax assets relate. The Company considers all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax planning strategies, and recent financial performance. A valuation allowance of $3.0 million has been recorded as of December 31, 2016, as compared to $8.7 million, as of December 31, 2017. The valuation allowance is based on the Company's assessment that it is more likely than not that the Company will not have taxable income in the foreseeable future.

Deferred tax liabilities associated with indefinite-life intangibles cannot be considered a source of income to support the realization of deferred tax assets because the reversal of these deferred tax liabilities is considered indefinite. However, as the Company has an indefinite-life asset with an unlimited loss carryforward period within the same jurisdiction, and of appropriate character, the deferred tax liability associated with the indefinite-life intangible constitutes a source of taxable income to support the realization of deferred tax asset, since both have indefinite reversal or expiration periods.

As of December 31, 2016, the Company had federal and state net operating loss carryforwards of $3.1 million and $9.2 million, respectively. As of December 31, 2017, the Company had federal and state net operating loss carryforwards of $23.3 million and $30.8 million, respectively. The federal research and development tax credits will begin to expire in 2031, while the state credits do not expire.

At December 31, 2016, the Company had federal and state research and development tax credits of $0.4 million and $0.2 million, respectively. As of December 31, 2017, the Company had federal and state research and development tax credits of $1.5 million and $0.6 million, respectively. The federal research and development tax credits will begin to expire in 2031, while the state credits do not expire.

During 2016, the Company created a subsidiary in the Cayman Islands. The Company intends to treat earnings from its foreign subsidiary as permanently reinvested but has no current or accumulated earnings as of December 31, 2016 and 2017. As such, there would be no U.S. tax effect of a repatriation of the earnings of its foreign subsidiary.

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Additionally, the utilization of the net operating loss and research and development tax credit carryforwards is subject to an annual limitation under Section 382 of the Internal Revenue Code. Future ownership changes as determined under Section 382 could further limit the utilization of net operating loss carryforwards. Due to the existence of the valuation allowance, future changes in the deferred tax assets related to these tax attributes will not impact the Company's effective tax rate.

The Company is subject to federal income tax as well as income tax of multiple state jurisdictions. The Company is not currently under examination by the IRS or state and local tax authorities.

The Company has unrecognized tax benefits related to uncertain tax positions of $0.2 million and $0.5 million as of December 31, 2016 and 2017, respectively. These uncertain positions are not expected to change within the next twelve months and would not impact the effective tax rate, if reversed. The Company did not accrue interest or penalties for these uncertain tax positions, as of December 31, 2017.

NOTE 15—EMPLOYEE BENEFIT PLAN

In 2015, the Company adopted a defined contribution retirement savings plan under Section 401(k) of the Internal Revenue Code. This plan covers all employees who meet minimum age and service requirements and allows participants to defer a portion of their annual compensation on a pre-tax basis. Company contributions to the plan may be made at the discretion of the Board of Directors. Total contributions by the Company during the years ended December 31, 2016 and 2017 were $27 thousand and $0.1 million, respectively.

NOTE 16—NET LOSS 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):

	Year Ended December 31,	
	2016	2017
Numerator:		
Net loss	$ (4,575)	$ (19,662)
Net loss attributable to common stockholders	$ (4,575)	$ (19,662)
Denominator:		
Weighted-average shares of common stock outstanding, basic and diluted	12,909,518	14,198,666
Net loss per share attributable to common stockholders, basic and diluted	$ (0.35)	$ (1.38)

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The Company's potentially dilutive securities, which include Preferred Stock, warrants to purchase Preferred Stock and common stock options, 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 common stock outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same. The Company excluded the following potential common shares, presented based on amounts outstanding at each period end, from the computation of diluted net loss per share attributable to common stockholders for the periods indicated because including them would have had an anti-dilutive effect:

	Year Ended December 31,	
	2016	2017
Convertible preferred stock (as converted to common stock)	9,696,798	12,950,443
Warrants to purchase convertible preferred stock (as converted to common stock)	—	116,618
Stock options to purchase common stock	2,758,002	2,052,654
Total	12,454,800	15,119,715

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, upon a qualified IPO, to the automatic conversion of all outstanding shares of 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 Preferred Stock (in thousands, except share and per share amounts):

	Year Ended December 31, 2017 (Unaudited)
Numerator:	
Net loss attributable to common stockholders	$ (19,662)
Pro forma net loss attributable to common stockholders	$ (19,662)
Denominator:	
Weighted-average shares of common stock outstanding, basic and diluted	14,198,666
Pro forma adjustment to reflect automatic conversion of convertible preferred stock into common stock upon the completion of the proposed initial public offering	11,149,796
Pro forma weighted-average shares of common stock outstanding, basic and diluted	25,348,462
Pro forma net loss per share attributable to common stockholders, basic and diluted	$ (0.78)

NOTE 17—SUBSEQUENT EVENTS

For its consolidated financial statements as of December 31, 2017 and for the year then ended, the Company evaluated subsequent events through November 1, 2018, the date on which those financial statements were issued.

In December 2017, the Company was granted an award in the amount of $19.8 million from the California Institute of Regenerative Medicine ("CIRM") to support the Company's ongoing clinical trial. Terms of the

award include an option to repay the grant or a royalty obligation upon commercialization of the program. Based upon the terms of the agreement, the Company will record proceeds as a liability when received. The award provided for a $4.6 million initial payment which was received in January 2018, an additional $3.8 million payment received in July 2018 and up to an aggregate of $11.4 million in future milestone payments.

In March 2018, the Company closed a Series B convertible preferred stock financing with gross proceeds of $30.5 million. The rights, preferences and privileges of the financing are substantially consistent with the Company's existing Preferred Stock.

In July 2018, the Company amended the Vindico merger agreement. The principal effect of the amendment was to extend the period in which the developmental milestone could occur to July 2019.

In August 2018, the Company amended the Loan Agreement. The amended terms increase the principal outstanding by $10.0 million and extend the interest-only period of the loan. Principal payments now commence in 2020. In conjunction with the amendment, the Company issued warrants to purchase up to 17,212 shares of Series B convertible preferred stock.

In August 2018 the Company entered into a commercial license agreement (the "2018 TeneoBio Agreement") with TeneoBio for the development and use of TeneoBio's single-domain, human heavy chain only antibodies in CAR T-cell therapies. Under the terms of the 2018 TeneoBio Agreement, the Company paid an upfront fee of $4.0 million.

In September 2018, the Company was granted an award in the amount of $4.0 million from the CIRM to support the Company's preclinical studies for the prostate cancer program. Terms of the award include an option to repay the grant or a royalty obligation upon commercialization of the program. Based upon the terms of the agreement, the Company will record proceeds as a liability when received. The award provided for a $1.0 million initial payment which was received in September 2018, and up to an aggregate of $3.0 million in future milestone payments.

In October 2018, the Company signed a new lease for office and laboratory space in San Diego, California. The lease term is expected to commence April 1, 2019 and expected to expire in December 2029. The initial annual base rent is approximately $2.5 million, and such amount will increase by 3% annually on the anniversary of the commencement date.

In October 2018, the Company increased the number of authorized shares of common stock from 40,000,000 shares to 41,468,474 shares.

In October 2018, the Company increased the number of shares of common stock authorized for issuance under the 2015 Plan from 5,454,710 shares to 7,454,710 shares.

From January 1, 2018 to October 17, 2018, the Company granted options under the 2015 Plan for the purchase of an aggregate of 1,301,391 shares of common stock, at a weighted-average exercise price of $4.91 per share, to employees, non-employees and directors.

Poseida Therapeutics, Inc.
CONDENSED CONSOLIDATED BALANCE SHEETS
(Unaudited)

(In thousands, except share amounts)	December 31, 2017	September 30, 2018	Pro Forma September 30, 2018
ASSETS			
Current assets:			
Cash and cash equivalents	$ 15,625	$ 38,534	$ 38,534
Prepaid expenses and other current assets	202	1,197	1,197
Total current assets	15,826	39,731	39,731
Property and equipment, net	1,725	2,055	2,055
Intangible assets, net	2,604	1,329	1,329
Goodwill	4,228	4,228	4,228
Other long-term assets	1,070	369	369
Total assets	$ 25,454	$ 47,712	$ 47,712
LIABILITIES, CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' DEFICIT			
Current liabilities:			
Accounts payable	$ 1,164	$ 1,590	$ 1,590
Accrued and other liabilities	2,484	3,553	3,553
Contingent consideration—short-term (inclusive of related party amounts of $1,019 and $1,618, respectively)	2,485	3,948	3,948
Term debt—short-term	1,111	—	—
Total current liabilities	7,245	9,091	9,091
Term debt—long-term	8,597	19,023	19,023
Deferred CIRM Grant Liability	—	9,400	9,400
Warrant Liability	275	1,336	—
Deferred tax liability	257	49	49
Other long-term liabilities	478	568	568
Total liabilities	16,851	39,467	38,131
Commitments and contingencies *(Note 11)*			
Convertible preferred stock (Series A, A-1 and B), $0.0001 par value 14,069,976 and 18,410,938 shares authorized at December 31, 2017 and September 30, 2018, respectively; 12,950,443 and 18,200,011 shares issued and outstanding at December 31, 2017 and September 30, 2018, respectively; liquidation preference of $72,460 at September 30, 2018	42,146	72,460	—
Stockholders' equity:			
Common stock, $0.0001 par value: 36,000,000 and 40,000,000 shares authorized at December 31, 2017 and September 30, 2018, respectively; 14,667,848 and 15,290,636 shares issued and outstanding at December 31, 2017 and September 30, 2018, respectively	1	2	3
Additional paid-in capital	(12,255)	(11,414)	62,381
Accumulated deficit	(21,290)	(52,803)	(52,803)
Total stockholders' deficit	(33,543)	(64,215)	9,581
Total liabilities, convertible preferred stock and stockholders' deficit	$ 25,454	$ 47,712	$ 47,712

The accompanying notes are an integral part of these condensed consolidated financial statements.

Poseida Therapeutics, Inc.
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
(Unaudited)

(In thousands, except share and per share amounts)	Nine Months Ended September 30, 2017	2018
Revenue	$ 2,985	$ —
Operating expenses:		
Research and development	14,745	21,130
General and administrative	3,884	7,277
Increase (decrease) in contingent consideration (inclusive of related party amounts of ($315) and $599, respectively)	(768)	1,462
Total operating expenses	17,861	29,869
Loss from operations	(14,876)	(29,869)
Other income (expense):		
Interest expense	(228)	(1,167)
Other income (expense), net	45	(686)
Net loss before income tax	(15,059)	(31,722)
Income tax benefit	188	208
Net loss and comprehensive loss	$ (14,871)	$ (31,514)
Net loss per share attributable to common stockholders, basic and diluted	$ (1.06)	$ (2.08)
Weighted-average commons shares outstanding, basic and diluted	14,044,726	15,158,963
Pro forma net loss per share attributable to common stockholders, basic and diluted		$ (0.96)
Pro forma weighted average common shares outstanding, basic and diluted		31,859,098

The accompanying notes are an integral part of these condensed consolidated financial statements.

Poseida Therapeutics, Inc.
CONDENSED CONSOLIDATED STATEMENTS OF CHANGES IN CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' DEFICIT
(Unaudited)

(In thousands, except share amounts)	Convertible preferred stock		Common Stock		Additional paid-in capital	Accumulated Deficit	Total Stockholders' Deficit
	Shares	Amount	Shares	Amount			
Balance at January 1, 2018	12,950,443	$42,146	14,667,848	$ 1	(12,255)	$ (21,290)	$ (33,543)
Net loss	—	—	—	—	—	(31,514)	(31,514)
							—
Issuance of common stock under employee stock compensation plans	—	—	622,187	1	245	—	246
Issuance of common Stock for the acquisition of Vindico			601	—	—		—
							—
Issuance of Series B preferred stock for cash net of issuance costs $186	5,249,568	30,314	—	—		—	—
Stock-based compensation expense	—	—	—	—	596	—	596
Balance at September 30, 2018	18,200,011	$72,460	15,290,636	$ 2	$ (11,414)	$ (52,804)	$ (64,215)
Balance at January 1, 2017	9,696,798	$31,063	13,794,692	$ 1	(13,018)	$ (1,628)	$ (14,645)
Net loss	—	—	—	—	—	(14,871)	(14,871)
							—
Issuance of common stock under employee stock compensation plans	—	—	811,018	—	314	—	314
Issuance of Series A-1 preferred stock for cash, net of issuance costs $77	3,253,645	11,083	—	—		—	—
Stock-based compensation expense	—	—	—	—	294	—	294
Balance at September 30, 2017	12,950,443	$42,146	14,605,710	$ 1	$ (12,410)	$ (16,499)	$ (28,908)

The accompanying notes are an integral part of these condensed consolidated financial statements.

Poseida Theraputics, Inc.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited)

(In thousands)	Nine Months Ended September 30, 2017	2018
OPERATING ACTIVITIES		
Net loss	$ (14,871)	$ (31,514)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation & amortization expense	502	536
Impairment of IPR&D	—	1,060
Stock-based compensation	294	596
Change in fair value of contingent liabilities	(778)	1,463
Change in preferred stock warrant liability	—	932
Accretion of discount on issued term debt	77	374
Deferred taxes	(188)	(207)
Changes in operating assets and liabilities:		
Accounts receivable	865	—
Prepaid expenses and other current assets	79	(995)
Other long-term assets	(1,007)	701
Accounts payable	145	426
Accrued liabilities	(442)	1,069
Accrued interest	—	(286)
Deferred revenue	(2,708)	—
Other long-term liabilities	148	41
Net cash used in operating activities	(17,884)	(25,804)
INVESTING ACTIVITIES		
Purchases of property and equipment	(177)	(651)
Net cash used in investing activities	(177)	(651)
FINANCING ACTIVITIES		
Net proceeds from stock option exercises	314	245
Deferred payments to Vindico shareholders	(449)	—
Issuance of Series A-1 financing, net of issuance costs	11,083	—
Issuance of Series B financing, net of issuance costs	—	30,314
Net proceeds from CIRM	—	9,400
Proceeds from term debt	10,000	10,000
Payment of debt issuance costs	(210)	(595)
Net cash provided by financing activities	20,738	49,364
Net increase in cash and cash equivalents	2,677	22,909
Cash and cash equivalents at beginning of period	17,892	15,625
Cash and cash equivalents at end of period	$ 20,569	$ 38,534
Non-cash investing and financing activities:		
Issuance of warrants with term debt	$ 275	$ 129
Purchases of property and equipment included in accounts payable and accrued liabilities	$ 2	$ —
Supplemental disclosure of cash flow information:		
Interest paid	$ 86	$ 714

The accompanying notes are an integral part of these financial statements.

Poseida Therapeutics, Inc.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

NOTE 1—SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Nature of Operations

Poseida Therapeutics, Inc. (the "Company" or "Poseida") is a clinical-stage biopharmaceutical company focused on leveraging its proprietary next-generation, non-viral gene engineering technologies to create life- saving therapeutics for patients with high unmet medical need.

The Company is subject to risks and uncertainties common to early-stage companies in the biotechnology industry, including, but not limited to, development by competitors of new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with government regulations and the ability to secure additional capital to fund operations. Product candidates currently under development will require significant additional research and development efforts, including extensive preclinical and clinical testing and regulatory approval prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel and infrastructure and extensive compliance-reporting capabilities. Even if the Company's drug development efforts are successful, it is uncertain when, if ever, the Company will realize significant revenue from product sales.

Going Concern

These financial statements have been prepared assuming the Company will continue as a going concern, which assumes the realization of assets and the satisfaction of liabilities and commitments in the normal course of business.

In accordance with Accounting Standards Update (''ASU'') 2014-15, *Presentation of Financial Statements–Going Concern (Subtopic 205-40): Disclosure of Uncertainties About an Entity's Ability to Continue as a Going Concern*, management is required to perform a two-step analysis over its ability to continue as a going concern. Management must first evaluate whether there are conditions and events that raise substantial doubt about the Company's ability to continue as a going concern (step 1). If management concludes that substantial doubt is raised, management is also required to consider whether its plans alleviate that doubt (step 2).

The Company has experienced net losses and negative cash flows from operations since its inception and has relied on its ability to fund its operations primarily through equity financings. The Company expects to continue to incur net losses for at least the next several years. As of September 30, 2018, the Company had an accumulated deficit of $52.8 million. The Company has a cash balance of $38.5 million as of September 30, 2018. Management has prepared cash flow forecasts which indicate that based on the Company's expected operating losses and negative cash flows, there is substantial doubt about the Company's ability to continue as a going concern without raising additional capital.

The Company's ability to continue as a going concern is dependent upon its ability to raise additional funding. The Company is seeking to complete an initial public offering ("IPO") of its common stock. In the event the Company does not complete an IPO, the Company expects to seek additional funding through private equity financings, debt financings, collaborations or grant funding. However, if the Company is unable to obtain adequate financing, it could be forced to delay, reduce or eliminate its research and development programs or other operations. If any of these events occur, the Company's ability to achieve the development and commercialization goals would be adversely affected. The Company does not have any additional financing in place and there can be no assurance that the Company can obtain financing, if at all, on terms acceptable to it.

Poseida Therapeutics, Inc.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

Basis of Preparation and Consolidation

The consolidated financial statements reflect the Company's financial position, results of operations and cash flows, in conformity with generally accepted accounting principles ("GAAP") in the United States and include the accounts of Poseida Therapeutics, Inc. and its wholly owned subsidiaries. The year-end condensed balance sheet data was derived from audited financial statements but does not include all disclosure required by accounting principles generally accepted in the United States of America. In management's opinion, all adjustments necessary for a fair statement are reflected in the interim period presented, all adjustments of a normal recurring nature have been made. All intercompany transactions and balances have been eliminated.

NOTE 2—SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Use of Estimates

The preparation of consolidated financial statements in conformity with GAAP requires the Company to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. On an ongoing basis, the Company evaluates its estimates, which include, but are not limited to, estimates related to accrued expenses, contingent consideration, warrant liability, stock-based compensation expense, deferred tax valuation allowances and the fair value of common stock. The Company bases its estimates on historical experience and other market-specific or relevant assumptions that it believes to be reasonable under the circumstances. Actual results may differ from those estimates or assumptions.

Unaudited Interim Financial Information

The accompanying consolidated balance sheet as of September 30, 2018, the condensed consolidated statements of operations and of cash flows for the nine months ended September 30, 2017 and 2018, and the condensed consolidated statement of changes in convertible preferred stock and stockholders' deficit for the nine months ended September 30, 2018 are unaudited. In the opinion of management, the unaudited data reflects all adjustments, which include only normal recurring adjustments, necessary for the fair statement of the Company's financial position as of September 30, 2018 and the results of its operations and comprehensive loss and its cash flows for the nine months ended September 30, 2017 and 2018. The financial data and other information disclosed in these notes related to the nine months ended September 30, 2017 and 2018 are also unaudited. The results for the nine months ended September 30, 2018 are not necessarily indicative of results to be expected for the year ending December 31, 2018, any other interim periods, or any future year or period.

Unaudited Pro Forma Information

Upon the closing of an IPO with proceeds over $50.0 million ("Qualified IPO"), all currently outstanding shares of convertible preferred stock will automatically convert into shares of common stock. The unaudited pro forma information does not assume any proceeds from the planned IPO.

The accompanying unaudited pro forma balance sheet as of September 30, 2018 has been prepared to give effect to the automatic conversion of all of the outstanding convertible preferred stock of the Company and the automatic conversion of warrants to purchase convertible preferred stock for warrants to purchase 133,830 shares of common stock and the reclassification of the warrant liability of $1.3 million to additional paid-in capital.

Pro forma basic and diluted net loss per share has been computed to give effect to the conversion of the shares of the Company's convertible preferred stock into common stock as if such conversion had occurred at the beginning of the period or the date of original issuance. The pro forma net loss per share does not include the shares of common stock expected to be sold and related proceeds to be received from an IPO.

Poseida Therapeutics, Inc.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

Stock-Based Compensation

Equity awards to employees are measured and recognized in the consolidated financial statements based on the fair value of the award on the grant date. The Company currently uses the Black-Scholes valuation model to estimate the grant date fair value of their share-based payments. The model requires the Company to make a number of assumptions including expected volatility, risk-free interest rate, expected term and expected dividend. Stock-based compensation expense is recognized straight-line over the term of the option grant. All option grants require continued service to continue vesting. Forfeitures are recognized as they occur.

The Company recognizes the fair value of stock options granted to non-employees as stock-based compensation expense over the period in which the related services are received. Stock-based compensation expense related to stock options granted to non-employees is recognized based on the vesting date fair value of awards as the stock options are earned. The Company believes that the estimated fair value of stock options is more readily measurable than the fair value of the services rendered.

Net Income (Loss) Per Share

The Company follows the two-class method when computing net income (loss) per share, as the Company has issued shares that meet the definition of participating securities. The two-class method determines net income (loss) per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities, which include the Company's Series A, Series A-1 and Series B convertible preferred stock, based upon their respective rights to receive dividends as if all income for the period had been distributed.

Basic net income (loss) per share attributable to common stockholders is computed by dividing the net income (loss) attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period. Diluted net income (loss) attributable to common stockholders is computed by adjusting net income (loss) attributable to common stockholders to reallocate undistributed earnings based on the potential impact of dilutive securities. Diluted net income (loss) per share attributable to common stockholders is computed by dividing the diluted net income (loss) attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period, including potential dilutive common shares assuming the dilutive effect of common stock equivalents.

The Company's convertible preferred stock contractually entitles the holders of such shares to participate in distributions 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 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 common shares 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 nine months ended September 30, 2017 and 2018.

Recently Adopted Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board ("FASB") issued ASU 2014-09, *Revenue from Contracts with Customers (Topic 606).* ASU 2014-9 is a comprehensive new revenue recognition model that requires a company to recognize revenue to depict the transfer of goods or services to a customer at an amount

Poseida Therapeutics, Inc.
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that reflects the consideration it expects to receive in exchange for those goods or services. In August 2015, the FASB issued ASU 2015-14, *Revenue from Contracts with Customers Deferral of Effective Date*. The amendments in this update defer the original effective date of ASU 2014-09 for all entities by one year. For public entities, the guidance is effective for annual reporting periods beginning after December 15, 2017 and for interim periods within those fiscal years. For nonpublic entities, the guidance is effective for annual reporting periods beginning after December 15, 2018. Early adoption is permitted for all entities. The Company adopted this standard on January 1, 2018 using the modified retrospective approach, the adoption of this standard had no impact on the financial statements as the Company currently has no marketed products or ongoing collaboration agreements.

In August 2014, the FASB issued ASU 2014-15, *Presentation of Financial Statements—Going Concern (Subtopic 205-40)*. ASU 2014-15 requires management to assess an entity's ability to continue as a going concern by incorporating and expanding upon certain principles that are currently in U.S. auditing standards. Specifically, the amendments (1) provide a definition of the term substantial doubt, (2) require an evaluation every reporting period, including interim periods, (3) provide principles for considering the mitigating effect of management's plans, (4) require certain disclosures when substantial doubt is alleviated as a result of consideration of management's plans, (5) require an express statement and other disclosures when substantial doubt is not alleviated, and (6) require an assessment for a period of one year after the date that the financial statements are issued (or available to be issued). The Company adopted this standard on January 1, 2017.

In September 2015, the FASB issued ASU No. 2015-16, *Business Combinations (Topic 805): Simplifying the Accounting for Measurement-Period Adjustments (Topic 805)*. ASU 2015-16 requires that an acquirer recognize adjustments to provisional amounts that are identified during the measurement period in the reporting period in which the adjustment amounts are determined and sets forth new disclosure requirements related to the adjustments. The Company adopted this standard on January 1, 2017, however, there was no impact on the Company's financial position or results of operations.

In August 2016, the FASB issued ASU 2016-15, *Statement of Cash Flows (Topic 230), Classification of Certain Cash Receipts and Cash Payments*. The guidance addresses the presentation and classification of certain cash receipts and cash payments in the statement of cash flows under Topic 230, including the classification of cash flows related to debt prepayment or extinguishment costs, contingent consideration payments made after a business combination and other key transactions. The guidance also clarifies how the predominance principle should be applied when cash receipts and cash payments have aspects of more than one class of cash flows For public entities, the guidance is effective for the annual reporting period beginning January 1, 2018 and for the interim periods within those fiscal years. For non-public entities, the guidance is effective for the annual reporting period beginning January 1, 2019 and early adoption is permitted. The Company has early adopted this standard on January 1, 2017, which resulted in the presentation of the deferred payment to the former stockholders of Vindico within the financing section of the statement of cash flows.

In January 2017, the FASB issued ASU 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Business*. ASU 2017-01 clarifies the framework for determining whether an integrated set of assets and activities meets the definition of a business. The revised framework establishes a screen for determining whether an integrated set of assets and activities is a business and narrows the definition of a business. The screen requires that when substantially all of the fair value of the gross assets acquired (or disposed of) is concentrated in a single identifiable asset or a group of similar identifiable assets, the set is not a business. This screen reduces the number of transactions that need to be further evaluated. This new accounting guidance is effective for public or private companies for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years. Early adoption is permitted. The new accounting guidance should be applied prospectively on or after the effective date. The Company adopted this guidance on January 1, 2017.

Poseida Therapeutics, Inc.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

In May 2017, the FASB issued ASU 2017-09, *Compensation-Stock Compensation (Topic 718): Scope of Modification Accounting*, which clarifies when a change to terms or conditions of a share-based payment award must be accounted for as a modification. The new guidance requires modification accounting if the vesting condition, fair value or the award classification is not the same both before and after a change to the terms and conditions of the award. The Company adopted this standard on January 1, 2018. The adoption of this standard had no impact on the financial statements.

In June 2018, the FASB issued ASU 2018-07, *Improvements to Nonemployee Share-Based Payment Accounting*. The new standard simplifies the accounting for share-based payments to nonemployees by aligning it with the accounting for share-based payments to employees, with certain exceptions. The new standard will be effective beginning January 1, 2019 and early adoption is permitted. The Company early adopted ASU 2018-07 effective January 1, 2018. The adoption of this standard did not have a material impact on the Company's financial position or results of operations upon adoption.

Recently Issued Accounting Pronouncements

In February 2016, the FASB issued ASU 2016-02, *Leases*. ASU 2016-02 provides revised guidance related to the accounting and reporting of leases, including a requirement for lessees to recognize most leases on the balance sheet. The recognition, measurement and presentation of expenses and cash flows arising from a lease by a lessee will depend on its classification as a finance or operating lease. For public entities, the guidance is effective for the annual reporting period beginning January 1, 2019 and for the interim periods within those fiscal years. For non-public entities, the guidance is effective for the annual reporting period beginning January 1, 2020. Companies must use a modified retrospective transition, with a number of practical expedients that entities may elect to apply. Early adoption is permitted. While management is currently assessing the impact this update will have to the Company's consolidated financial statements, the expected primary impact to its consolidated financial position upon adoption will be the recognition, on a discounted basis, of its minimum commitments under noncancelable operating leases on its consolidated balance sheets resulting in the recording of right of use assets and lease liabilities. Our current minimum commitments under noncancelable operating leases are disclosed in Note 11.

NOTE 3—COMPOSITION OF CERTAIN BALANCE SHEET COMPONENTS

Prepaid expenses and other current assets

Prepaid expenses and other current assets consist of the following as of (in thousands):

	December 31, 2017	September 30, 2018
Rent	$ 62	$ 64
Insurance	55	117
Contract research services	21	823
Other	64	193
	$ 202	$ 1,197

Poseida Therapeutics, Inc.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

Property and equipment, net

Property and equipment, net consist of the following as of (in thousands):

	December 31, 2017	September 30, 2018
Lab equipment	$ 1,563	$ 2,189
Leasehold improvements	536	536
Computer equipment and software	111	121
Furniture and fixtures	65	80
Total property and equipment	2,275	2,926
Less: Accumulated depreciation and amortization	(550)	(871)
Total property and equipment, net	$ 1,725	$ 2,055

Depreciation expense associated with property and equipment was $0.3 million each of the nine months ended September 30, 2017 and 2018.

Goodwill and Other Intangible Assets

Goodwill and other intangible assets consist of the following as of (in thousands):

	December 31, 2017	September 30, 2018
Goodwill	$ 4,228	$ 4,228
Indefinite lived intangible assets		
IPR&D	$ 2,380	$ 1,320
Definite lived intangible assets		
Non-compete agreements	580	580
Less: accumulated amortization	(356)	(571)
Total intangible assets, net	$ 2,604	$ 1,329

Amortization expense of acquired definite intangible assets was $0.2 million for each of the nine months ended September 30, 2017 and 2018. Impairment expense of indefinite lived intangible assets was zero and $1.1 million for the nine months ended September 30, 2017 and 2018, included within research and development expenses in the condensed consolidated statement of operations.

Other Long-Term Assets

Other long-term assets consist of the following as of (in thousands):

	December 31, 2017	September 30, 2018
Contract research services	$ 1,007	$ 309
Security deposit	63	60
Total other long-term assets	$ 1,070	$ 369

Poseida Therapeutics, Inc.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

Accrued and other liabilities

Accrued and other liabilities consist of the following as of (in thousands):

	December 31, 2017	September 30, 2018
Payroll and related expense	$ 1,392	$ 854
Contract research services	906	2,096
Professional fees	140	481
Other	46	122
Total accrued and other liabilities	$ 2,484	$ 3,553

NOTE 4—FAIR VALUE MEASUREMENT

Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants as of the measurement date. Applicable accounting guidance provides an established hierarchy for inputs used in measuring fair value that maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that the most observable inputs be used when available. Observable inputs are inputs that market participants would use in valuing the asset or liability and are developed based on market data obtained from sources independent of the Company. Unobservable inputs are inputs that reflect the Company's assumptions about the factors that market participants would use in valuing the asset or liability. There are three levels of inputs that may be used to measure fair value:

- Level 1: Unadjusted quoted prices in active markets that are accessible at the measurement date for identical, unrestricted assets or liabilities
- Level 2: Significant other observable inputs other than Level 1 prices such as quoted prices in markets that are not active, or inputs that are observable, either directly or indirectly, for substantially the full term of the asset or liability
- Level 3: Prices or valuation techniques that require inputs that are both significant to the fair value measurement and unobservable (i.e., supported by little or no market activity)

Poseida Therapeutics, Inc.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

The Company has classified assets and liabilities measured at fair value on a recurring basis as follows (thousands):

	Level 1	Level 2	Level 3
At December 31, 2017:			
Assets			
Indefinite-lived intangible assets	$ —	$ —	$ 2,380
Total Assets	$ —	$ —	$ 2,380
Liabilities			
Contingent Consideration	$ —	$ —	$ 2,485
Warrant Liability	—	—	275
Total Liabilities	$ —	$ —	$ 2,760
At September 30, 2018:			
Assets			
Indefinite-lived intangible assets	$ —	$ —	$ 1,320
Total Assets	$ —	$ —	$ 1,320
Liabilities			
Contingent Consideration	$ —	$ —	$ 3,948
Warrant Liability	—	—	1,336
Total Liabilities	$ —	$ —	$ 5,284

In connection with the Vindico acquisition, the Company acquired indefinite-lived intangible assets related to the acquired nanoparticle technology. During the nine months ended September 30, 2018, a delay in development of the acquired technology and results of recent preclinical activities, taken together constituted a triggering event that required the Company to evaluate the acquired indefinite lived intangible assets for impairment. The Company determined the best estimate of the current fair value of these assets was $1.3 million using a discounted cash flow method. Impairment expense of indefinite lived intangible assets was zero and $1.1 million for the nine months ended September 30, 2017 and 2018, included within research and development expenses in the condensed consolidated statement of operations.

In connection with the Vindico acquisition, the Company agreed to pay additional purchase consideration, based on the achievement of a certain developmental milestone using the acquired technology by October 2018, payable in shares of the Company's common stock. In July 2018, the Company amended the terms of the Vindico merger agreement, which included an extension of the contingency period through July 2019, the calculation to determine the number of shares to be settled and an option to settle the contingency in cash under certain circumstances. This contingent consideration is measured at fair value and is based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The value of contingent consideration uses assumptions the Company believes would be made by a market participant. The Company estimates the fair value of contingent consideration on an on-going basis as additional data impacting the assumptions is obtained.

Contingent consideration may change significantly as development progresses and additional data is obtained, impacting the Company's assumptions regarding probabilities of successful achievement of the milestone and timing in which it is expected to be achieved. In evaluating the fair value information, judgment is

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required to interpret the market data used to develop the estimates. The estimates of fair value may not be indicative of the amounts that could be realized in a current market exchange. Accordingly, the use of different market assumptions and/or different valuation techniques could result in materially different fair value estimates.

The significant unobservable inputs used in the measurement of fair value of the Company's contingent consideration are probabilities of successful achievement of the milestone, the probability of settling the milestone in shares, the number of shares to be issued and the valuation of the Company's common stock. Significant increases or decreases in the probability of success would result in a significantly higher or lower fair value measurement, respectively. Significant increases or decreases in the estimated valuation of common stock would result in a significantly higher or lower fair value measurement, respectively. As of December 31, 2017, the estimated probability of successfully achieving the milestone was determined to be 50% and the estimated fair value of the common stock used was $1.55 per share. The estimated number of shares issuable was 3.2 million as of December 31, 2017. As of September 30, 2018, the probability of successfully achieving the milestone by the end of the contingency period was reduced to 25%. The effect of the reduction in probability was offset by the increase fair value of the common stock, determined to be $11.41 per share as of September 30, 2018. The estimated number of shares to be issued was 1.5 million as of September 30, 2018. The change in contingent consideration was a decrease of $0.8 million and an increase of $1.5 million, for the nine months ending September 30, 2017 and 2018, respectively.

The Companies classifies this contingent consideration as a liability on its consolidated balance sheets that it remeasures to fair value at each reporting date, and the Company recognizes changes in the fair value of the contingent consideration liability as a component of operating income (loss) in its consolidated statements of operations. The Company will continue to recognize changes in the fair value of the contingent consideration liability until the milestone is met or the milestone period has expired.

The preferred stock warrant liability in the table above consisted of the fair value of warrants to purchase Series A-1 convertible preferred stock ("Series A-1 Preferred Stock") and Series B convertible preferred stock (Series B Preferred Stock") and was based on significant inputs not observable in the market, which represent a Level 3 measurement within the fair value hierarchy. The Company's valuation of the preferred stock warrants utilized the Black-Scholes option-pricing model, which incorporates assumptions and estimates to value the preferred stock warrants.

The quantitative elements associated with the Company's Level 3 inputs impacting the fair value measurement of the preferred stock warrant liability include the fair value per share of the underlying Series A-1 and Series B Preferred Stock, the remaining contractual term of the warrants, risk-free interest rate, expected dividend yield and expected volatility of the price of the underlying preferred stock. The most significant assumption in the Black-Scholes option-pricing model impacting the fair value of the preferred stock warrants is the fair value of the Company's convertible preferred stock as of each remeasurement date. The Company determines the fair value per share of the underlying preferred stock by taking into consideration its most recent sales of its convertible preferred stock as well as additional factors that the Company deems relevant. As of December 31, 2017 and September 30, 2018, the fair value per share of the Series A-1 Preferred Stock was $3.06 and $11.72, respectively. As of September 30, 2018, the fair value per share of the Series B Preferred Stock was $11.96. The Company historically has been a private company and lacks company-specific historical and implied volatility information of its stock. Therefore, it estimates its expected stock volatility based on the historical volatility of publicly traded peer companies for a term equal to the remaining contractual term of the warrants. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve for time periods approximately equal to the remaining contractual term of the warrants. The Company has estimated a 0% dividend yield based on the expected dividend yield and the fact that the Company has never paid or declared

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dividends. The change in fair value of warrant liability was zero and $0.9 million, for the nine months ending September 30, 2017 and 2018, respectively, included with other income (expense) within the condensed consolidated statement of operations.

A reconciliation of the Level 3 assets as of September 30, 2018 is as follows (in thousands):

Fair value of Level 3 assets as of December 31, 2017	$ 2,380
Impairment of IPR&D	(1,060)
Fair value of Level 3 assets at September 30, 2018	$ 1,320

A reconciliation of the Level 3 liabilities as of September 30, 2018 is as follows (in thousands):

Fair value of Level 3 liabilities as of December 31, 2017	$ 2,760
Issuance of warrants to purchase shares of Series B convertible preferred stock	129
Change in fair value of contingent consideration	1,463
Change in fair value of warrant liability	932
Fair value of Level 3 liabilities at September 30, 2018	$ 5,284

NOTE 5—CALIFORNIA INSTITUTE OF REGENERERATIVE MEDICINE AWARDS

The Company has been awarded funding from California Institute of Regenerative Medicine (“CIRM”) to develop internal programs. Under the terms of the funding (“CIRM Award”) both CIRM and the Company will co-fund a specified program, under which funding is paid in developmental milestones determined as a part of the award. The Company is obligated to share future revenue for the related program with CIRM. The percentage of revenue is dependent on the amount of the award received and whether revenue is from product sales or license fees. The maximum revenue sharing amount the Company may be required to pay to CIRM is equal to nine times the total amount awarded and paid to the Company. The Company has the option to decline any and all amounts awarded by CIRM. As an alternative to revenue sharing, the Company has the option to convert the award to a loan, which such option the Company must exercise on or before ten (10) business days after the FDA notifies the Company that it has accepted the Company’s application for marketing authorization. In the event the Company exercises its right to convert the award to a loan, it would be obligated to repay the loan within ten (10) business days of making such election. Repayment amounts vary dependent on when the award is converted to a loan, ranging from 60% of the award granted to amounts received plus interest at the rate of the three-month LIBOR rate plus 10% per annum. Since the Company may be required to repay some or all of the amounts awarded by CIRM, the Company accounted for this award as a liability rather than revenue as the Company’s current intent is to convert the award into a loan. Given the uncertainty in amounts due upon repayment, the Company has recorded amounts received without any discount or interest recorded, upon determination of amounts that would become due, the Company will adjust accordingly.

In December 2017, the Company was granted an award in the amount of $19.8 million from CIRM to support the Company’s P-BCMA-101 Phase 1 clinical trial. The award provided for a $4.6 million initial payment which was received in January 2018, an additional $3.8 million payment received in July 2018 and up to an aggregate of $11.4 million in future milestone payments.

In September 2018, the Company was granted an award in the amount of $4.0 million from CIRM to support the Company’s preclinical studies for P-PSMA-101 program. The award provided for a $1.0 million

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initial payment which was received in September 2018, and up to an aggregate of $3.0 million in future milestone payments.

NOTE 6—TERM DEBT

On July 25, 2017, the Company entered into a loan and security agreement (the "Original Loan Agreement") with Oxford Finance LLC ("Oxford"), whereby it borrowed $10.0 million (the "Original Term A Loan"). Balances under the Original Loan were due in monthly principal and interest payments, with a final maturity date of August 2021. The Initial Loan included a final payment fee of 8.50% of the original principal amount due upon maturity.

In August 2018, the Company entered into an Amended and Restated Loan and Security Agreement ("Amended Loan Agreement") with Oxford, pursuant to which Oxford agreed to lend the Company up to $30.0 million, issuable in three separate term loans of the Original Term A Loan, $10.0 million ("New A Term Loan"), and $10.0 million ("Term B Loan"), collectively referred to as the "Term Loans"). The Company received $10.0 million in proceeds from the New Term A Loan, net of debt issuance costs and accrued interest of $0.9 million. Under the terms of the Amended Loan Agreement the Company may, at its sole discretion, borrow $10.0 million under the Term B Loan following the achievement of a defined milestone event until the earlier of 60 days thereafter or December 20, 2018.

The Company evaluated the amendment in accordance with Accounting Standards Codification ("ASC") Topic 470 *Debt*, which requires the assessment of whether the modification was considered a substantial modification, in which case the modification would be accounted for as a debt extinguishment. Based on the Company's evaluation, the modification was not considered substantial and as such treated as a debt modification.

All outstanding Term Loans will mature on March 1, 2023 (the "Maturity Date") and will have interest- only payments through April 1, 2020, followed by 36 equal monthly payments of principal and unpaid accrued interest. The Term Loans will bear interest at a floating per annum rate equal to (i) 6.94% plus (ii) the greater of (a) the 30-day U.S. Dollar LIBOR rate reported in The Wall Street Journal on the last business day of the month that immediately precedes the month in which the interest will accrue and (b) 2.0%. The Company will be required to make a final payment of 7.5% of the principal balance outstanding, payable on the earlier of (i) the Maturity Date, (ii) acceleration of any Term Loan, or (iii) the prepayment of the Term Loans.

There is an option to prepay all, but not less than all, of the borrowed amounts, provided that the Company will be obligated to pay a prepayment fee equal to (i) 3.0% of the outstanding principal balance of the applicable Term Loan if prepayment is made after August 13, 2018 (the "Funding Date") through and including the first anniversary of the Funding Date (ii) 2.0% of the outstanding balance after the first anniversary through and including the second anniversary of the Funding Date of the Term Loan or (iii) 1.0% of the applicable Term Loan prepaid after the second anniversary of the Funding Date and prior to the Maturity Date.

The Company may use the proceeds from the Term Loans solely for working capital and to fund its general business requirements. The Company's obligations under the Loan Agreement are secured by a first priority security interest in substantially all of its current and future assets, other than our intellectual property. In addition, the Company has also agreed not to encumber its intellectual property assets, except as permitted by the Loan Agreement. While any amounts are outstanding under the Loan Agreement, the Company is subject to a number of affirmative and restrictive covenants, including covenants regarding dispositions of property, business combinations or acquisitions, among other customary covenants. The Company is also restricted from paying

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dividends or making other distributions or payments on its capital stock in excess of $0.3 million, on an annual basis, subject to limited exceptions. As of September 30, 2018, the Company was in compliance with all covenants under the Loan Agreement.

Pursuant to the Original Loan Agreement, on July 25, 2017, the Company issued to Oxford warrants to purchase an aggregate of up to 116,618 shares of the Company's Series A-1 Preferred Stock ("Series A-1 Warrants") at an exercise price of $3.43 per share. The warrants were immediately exercisable and will expire ten years from the date of the grant. The Company determined the fair value of the Series A-1 Warrants on the date of issuance was $0.3 million using the Black-Scholes pricing model utilizing the following inputs: risk-free interest rate—2.3%, volatility—77.8%, dividend yield—0% and expected life in years—10.

Pursuant to the Amended Loan Agreement, on August 13, 2018, the Company issued to Oxford warrants to purchase an aggregate of up to 17,212 shares of the Company's Series B Preferred Stock ("Series B Warrants") at an exercise price of $5.81 per share. The warrants were immediately exercisable and will expire ten years from the date of the grant. The Company determined the fair value of the Series B Warrants on the date of issuance was $0.1 million using the Black-Scholes pricing model utilizing the following inputs: risk-free interest rate—2.9%, volatility—75%, dividend yield—0% and expected life in years—10.

The fair value of the warrants was treated as a debt discount and as a preferred stock warrant liability. The debt discount is amortized over the term of the loan to interest expense.

As of September 30, 2018, there was $20.0 million outstanding under the Original Term A Loan and New Term Loan A (collectively "Term A Loan"). The Term A Loan was recorded at its initial carrying value of $20.0 million. In connection with the Term A Loan, the debt issuance costs of $1.0 million have been recorded as a debt discount, including the remaining unrecognized discount from the Original Term A Loan, on the Company's consolidated balance sheets, which are being accreted to interest expense over the life of the Term A Loan. Interest on the term loan, consisting of the stated interest rate, final payment fee and amortization of the discount, is being recognized under the effective interest method using a rate of 12.8%.

As of September 30, 2018, the estimated future principal payments for the Original Term A and New Term A Loan due under the Loan Agreement are as follows (in thousands):

Year ending December 31,:	
2018	$ —
2019	—
2020	5,000
2021	6,667
2022	6,667
2023	1,666
Total future principal payments	$20,000

NOTE 7—RELATED PARTY TRANSACTIONS

The amendment to the Vindico merger agreement was deemed a related party transaction. The Company's Chief Executive Officer was also formerly Chief Executive Officer of Vindico as well as a greater than 10% shareholder in both entities. Holders of 53% of the Company's shares prior to acquisition also held 62% ownership of Vindico shares. As a result of his former ownership of Vindico's capital stock, the Company's Chief Executive Officer would be entitled to receive up to 41.0% of the total milestone contingent consideration receivable by former stockholders of Vindico if the milestone is achieved.

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NOTE 8—CONVERTIBLE PREFERRED STOCK

As of each balance sheet date, the Preferred Stock consisted of the following (in thousands, except share amounts):

	December 31, 2017				
	Preferred Stock Authorized	Preferred Stock Issued and Outstanding	Carrying Value	Liquidation Preference	Common Stock Issuable Upon Conversion
Series A Preferred Stock	9,696,798	9,696,798	$31,063	$ 31,063	9,696,798
Series A-1 Preferred Stock	4,373,178	3,253,645	11,083	11,083	3,253,645
	14,069,976	12,950,443	$42,146	$ 42,146	12,950,443

	September 30, 2018				
	Preferred Stock Authorized	Preferred Stock Issued and Outstanding	Carrying Value	Liquidation Preference	Common Stock Issuable Upon Conversion
Series A Preferred Stock	9,696,798	9,696,798	$31,063	$ 31,063	9,696,798
Series A-1 Preferred Stock	3,428,572	3,253,645	11,083	11,083	3,253,645
Series B Preferred Stock	5,285,568	5,249,568	30,314	30,314	5,249,568
	18,410,938	18,200,011	$72,460	$ 72,460	18,200,011

The Company has issued Series A convertible preferred stock (the “Series A Preferred Stock”), Series A-1 Preferred Stock and Series B Preferred Stock. The Series A Preferred Stock, Series A-1 Preferred Stock and Series B Preferred Stock are collectively referred to as the “Preferred Stock.”

In March 2018, the Company issued 5,249,568 shares of Series B Preferred Stock with a stated value of $5.81 per share. The cash proceeds for the Series B Preferred Stock was $30.3 million, net of issuance costs of $0.2 million.

The rights, preferences and privileges of the Preferred Stock are as follows:

Dividends

The holders of the outstanding shares of Preferred Stock are entitled to receive dividends, when and if declared by the Board of Directors. Such dividends are payable in preference to any dividends for common stock declared by the Board of Directors. As of September 30, 2018, no dividends have been declared.

Conversion

Each share of Preferred Stock is convertible at any time, at the option of the holder, into an equal number of fully paid shares of common stock. The conversion price is subject to adjustment for recapitalization (i.e. stock dividend, stock split, combination of shares, reorganization, recapitalization, reclassification or other similar event).

Each share of convertible Preferred Stock automatically converts into common stock at the effective conversion rate upon the closing of an initial public offering in which the public offering gross proceeds exceed $50.0 million, or upon the affirmative vote by holders of the majority of the outstanding Preferred Stock.

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Liquidation

In the event of any voluntary or involuntary liquidation, dissolution or winding-up of the Company or Deemed Liquidation Event (as described below), the holders of the Preferred Stock shall be entitled to receive, prior and in preference to any distribution of any of the assets of the Company to the holders of the common stock an amount equal to the greater of (i) the applicable Preferred Stock original issue price, plus any dividend declared but unpaid, or (ii) the amount per share that would have been payable had all shares of Preferred Stock been converted into common stock immediately prior to such Deemed Liquidation Event.

Unless the holders of the majority of the then-outstanding shares of Preferred Stock, voting together as a single class on an as-converted basis, elect otherwise, a Deemed Liquidation Event shall include a merger or consolidation (other than one in which stockholders of the Company own a majority by voting power of the outstanding shares of the surviving or acquiring corporation) or a sale, lease, transfer, exclusive license or other disposition of all or substantially all of the assets of the Company.

If upon the liquidation, dissolution or winding up of the Company, the assets of the Company legally available for distribution to the holders of the Preferred Stock are insufficient to permit the payment to such holders of the full amounts, then the entire assets of the corporation legally available for distribution shall be distributed with equal priority and pro rata among the holders of the Preferred Stock in proportion to the full amounts they would otherwise be entitled to receive.

After the payment or setting aside for payment to the holders of Preferred Stock of the full amounts specified above, the entire remaining assets of the Company legally available for distribution shall be distributed with equal priority and pro rata among the holders of the Preferred Stock and common stock.

As the Company’s amended and restated certificate of incorporation contains a provision that upon a change of control of the Company the Preferred Stock is redeemable at the holder’s option, the Preferred Stock have been classified outside of stockholders’ deficit in the Company’s consolidated balance sheets.

Voting

The holder of each share of Preferred Stock is entitled to the number of votes equal to the number of shares of common stock into which such holder’s shares of Preferred Stock can be converted.

NOTE 9—COMMON STOCK

The Company’s amended and restated certificate of incorporation authorizes the Company to issue 40,000,000 shares of $0.0001 par value common stock. Each share of common stock is entitled to one vote. The holders of common stock are also entitled to receive dividends whenever funds are legally available and when declared by the Board of Directors, subject to the prior rights of holders of all classes of Preferred Stock outstanding. Since the Company’s inception, there have been no dividends declared.

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NOTE 10—STOCK OPTION PLAN

Following is a summary of the Company's stock option plan activity and related information:

	Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (Years)	Intrinsic Value (thousands)
Balance at January 1, 2018	2,052,654	$ 0.82	8.02	
Options Granted	1,210,891	4.29		
Exercised	(622,187)	0.39		
Cancelled	(173,118)	1.12		
Balance at September 30, 2018	2,468,240	$ 2.61	8.56	$ 21,719
Options Vested & Expected to Vest as of September 30, 2018	2,468,240	$ 2.61	8.56	$ 21,719
Options Exercisable as of September 30, 2018	746,791	$ 1.08	7.71	$ 7,712

The aggregate intrinsic value of options exercised during the nine months ended September 30, 2017 and 2018 was $0.8 million and $1.0 million, respectively, determined as of the date of exercise. The Company received $0.3 million and $0.2 million in cash from options exercised during nine months ended September 30, 2017 and 2018, respectively.

The Company recorded stock-based compensation expense in the following expense categories of its consolidated statements of operations (in thousands):

	Nine Months Ended September 30,	
	2017	2018
Research and development	$ 90	$ 230
General and administrative	204	366
Total stock-based compensation	$ 294	$ 596

As of September 30, 2018, total unrecognized compensation cost related to stock options was $3.8 million, and the weighted-average period over which this cost is expected to be recognized is approximately 3.5 years.

The assumptions that the Company used to determine the fair value of options granted to employees, non-employees and directors were as follows:

	Nine months ended September 30,	
	2017	2018
Risk-free interest rate	1.92%-2.16%	2.69%-2.93%
Expected volatility	80%-82%	80%
Expected term (years)	5.8-6 years	6
Dividend Yield	—	—

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NOTE 11—COMMITMENTS AND CONTINGENCIES

License Agreements

August 2018 Commercial License Agreement with TeneoBio, Inc.

On August 3, 2018, the Company entered into a commercial license agreement (the "2018 TeneoBio Agreement") with TeneoBio, Inc. ("TeneoBio") pursuant to which the Company obtained exclusive rights to research, develop and commercialize up to a certain number of targets from TeneoBio.

Pursuant to the 2018 TeneoBio Agreement, the Company has paid TeneoBio an upfront fee of $4.0 million. The Company is required to pay TeneoBio up to an aggregate of $31.0 million upon the first achievement of certain clinical and regulatory milestones for each product, none of which have been met. The Company is also obligated to pay, on a product-by-product and country-by-country basis, a royalty in the low single-digit percentage on net sales of any licensed products.

NOTE 12—NET LOSS 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):

	Nine Months Ended September 30,	
	2017	2018
Numerator:		
Net loss	$ (14,871)	$ (31,514)
Net loss attributable to common stockholders	$ (14,871)	$ (31,514)
Denominator:		
Weighted-average common stock outstanding, basic and diluted	14,044,726	15,158,963
Net loss per share attributable to common stockholders, basic and diluted	$ (1.06)	$ (2.08)

The Company's potentially dilutive securities, which include Preferred Stock, warrants to purchase Preferred Stock and common stock options, 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 common stock outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same. The Company excluded the following potential common shares, presented based on amounts outstanding at each period end, from the computation of diluted net loss per share attributable to common stockholders for the periods indicated because including them would have had an anti-dilutive effect:

	Nine Months Ended September 30,	
	2017	2018
Convertible preferred stock (as converted to common stock)	12,950,443	18,200,011
Warrants to purchase convertible preferred stock (as converted to common stock)	116,618	133,830
Stock options to purchase common stock	2,003,042	2,468,240
	15,070,103	20,802,081

Poseida Therapeutics, Inc.
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Unaudited Pro Forma Net Loss Per Share

The unaudited pro forma basic and diluted net loss per share attributable to common stockholders, for the nine months ended September 30, 2018 has been prepared to give effect, upon a Qualified IPO, to the automatic conversion of the shares of all outstanding shares of Preferred Stock into common stock as if such conversion had occurred on the later of January 1, 2017 or the issuance date of the Preferred Stock (in thousands, except share and per share amounts):

	Nine Months Ended September 30, 2018
Numerator:	
Net loss attributable to common stockholders	$ (31,514)
Change in fair value of preferred stock warrant liability	932
Pro forma net loss attributable to common stockholders	$ (30,582)
Denominator:	
Weighted-average common shares outstanding, basic and diluted	15,158,963
Pro forma adjustment to reflect automatic conversion of convertible preferred stock into common stock upon the completion of the proposed initial public offering	16,700,134
Pro forma weighted-average common stock outstanding, basic and diluted	31,859,098
Pro forma net loss per share attributable to common stockholders, basic and diluted	$ (0.96)

NOTE 13—SUBSEQUENT EVENTS

For its consolidated interim financial statements as of September 30, 2018 and for the nine months then ended, the Company evaluated subsequent events through December 11, 2018, the date on which those financial statements were issued.

In October 2018, the Company signed a new lease for office and laboratory space in San Diego, California. The lease term is expected to commence April 1, 2019 and expected to expire in December 2029. The initial annual base rent is approximately $2.5 million, and such amount will increase by 3% annually on the anniversary of the commencement date.

In October 2018, the Company increased the number of authorized shares of common stock from 40,000,000 shares to 41,468,474 shares.

In October 2018, the Company increased the number of shares of common stock authorized for issuance under the 2015 Plan from 5,454,710 shares to 7,454,710 shares.

In November 2018, the Company received a $4.4 million milestone payment from CIRM related to its award to co-fund the P-BCMA-101 Phase 1 clinical trial.

Shares

Poseida Therapeutics, Inc.

Common Stock

PRELIMINARY PROSPECTUS

, 2018

Citigroup
Credit Suisse
Wells Fargo Securities

Through and including , 2018 (the 25th day after the date of this prospectus), all dealers that buy, sell or trade shares of our common stock, 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.

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution.

The following table sets forth all expenses to be paid by us, other than underwriting discounts and commissions, in connection with this offering. All amounts shown are estimates except for the SEC registration fee, the FINRA filing fee and the Nasdaq listing fee.

	Amount Paid or To Be Paid
SEC registration fee	$ *
FINRA filing fee	*
Nasdaq listing fee	*
Legal fees and expenses	*
Accounting fees and expenses	*
Printing and engraving expenses	*
Transfer agent and registrar fees and expenses	*
Miscellaneous expenses	*
Total	$ *

* To be filed by amendment.

Item 14. Indemnification of Directors and Officers.

Section 145 of the Delaware General Corporation Law authorizes a court to award, or a corporation's board of directors to grant, indemnity to directors and officers in terms sufficiently broad to permit such indemnification under certain circumstances for liabilities, including reimbursement for expenses incurred, arising under the Securities Act. Our amended and restated certificate of incorporation that will be in effect on the completion of this offering permits indemnification of our directors, officers, employees and other agents to the maximum extent permitted by the Delaware General Corporation Law, and our amended and restated bylaws that will be in effect on the completion of this offering provide that we will indemnify our directors and officers and permit us to indemnify our employees and other agents, in each case to the maximum extent permitted by the Delaware General Corporation Law.

We have entered into indemnification agreements with our directors and officers, whereby we have agreed to indemnify our directors and officers to the fullest extent permitted by law, including indemnification against expenses and liabilities incurred in legal proceedings to which the director or officer was, or is threatened to be made, a party by reason of the fact that such director or officer is or was a director, officer, employee or agent of our company, provided that such director or officer acted in good faith and in a manner that the director or officer reasonably believed to be in, or not opposed to, the best interest of our company. At present, there is no pending litigation or proceeding involving a director or officer of our company regarding which indemnification is sought, nor is the registrant aware of any threatened litigation that may result in claims for indemnification.

We maintain insurance policies that indemnify our directors and officers against various liabilities arising under the Securities Act of 1933, as amended, or the Securities Act, and the Securities Exchange Act of 1934, as amended, that might be incurred by any director or officer in his or her capacity as such.

The underwriters are obligated, under certain circumstances, under the underwriting agreement to be filed as Exhibit 1.1 hereto, to indemnify us and our officers and directors against liabilities under the Securities Act.

Item 15. Recent Sales of Unregistered Securities.

The following sets forth information regarding all unregistered securities issued and sold by the Registrant since January 1, 2015:

(1) From February 2015 to June 2015, the Registrant sold, in a series of closings, convertible promissory notes in the aggregate principal amount of $2.8 million. Such convertible promissory notes were converted into 884,324 shares of Series A preferred stock in December 2015.

(2) In February 2015, the Registrant issued 12,035,811 shares of common stock to Transposagen Biopharmaceuticals, Inc. in exchange for certain assets pursuant to that certain Asset Contribution Agreement, dated February 9, 2015, by and between the Registrant and Transposagen Biopharmaceuticals, Inc.

(3) From December 2015 to March 2016, the Registrant sold, in three closings, an aggregate of 9,696,798 shares of Series A preferred stock at a purchase price of $3.43 per share for an aggregate purchase price of 33.3 million, including the conversion of the convertible promissory notes as described in note (1).

(4) From October 2016 to June 2018, the Registrant issued an aggregate of 437,115 shares of common stock to stockholders of Vindico NanoBioTechnology LLC (formerly known as Vindico NanoBioTechnology, Inc.) pursuant to that certain Agreement and Plan of Merger and Reorganization, dated October 10, 2016, by and among the Registrant, Hermes Merger Sub I, Inc., Hermes Merger Sub II, LLC, Vindico NanoBioTechnology, LLC and Christopher Young as Stockholders' Representative, as amended.

(5) In July 2017, the Registrant sold an aggregate of 3,253,645 shares of Series A-1 preferred stock at a purchase price of $3.43 per share for an aggregate purchase price of $11.2 million.

(6) On July 25, 2017, the Registrant issued two warrants to purchase an aggregate of 116,618 shares of Series A-1 preferred stock to Oxford Finance LLC at an exercise price of $3.43 per share. The warrants were issued in connection with the Registrant's entry into a loan and security agreement with the warrant holder. Upon the conversion of the Registrant's preferred stock in connection with the closing of this offering, the warrants will become exercisable for 116,618 shares of the Registrant's common stock at an exercise price of $3.43 per share.

(7) In March 2018, the Registrant sold, in two closings, an aggregate of 5,249,568 shares of Series B preferred stock at a purchase price of $5.81 per share for an aggregate purchase price of $30.5 million.

(8) On August 13, 2018, the Registrant issued a warrant to purchase 17,212 shares of Series B preferred stock to Oxford Finance LLC at an exercise price of $5.81 per share. The warrant was issued in connection with the Registrant's entry into an amendment to the loan and security agreement with the warrant holder. Upon the conversion of the Registrant's preferred stock in connection with the closing of this offering, the warrant will become exercisable for 17,212 shares of the Registrant's common stock at an exercise price of $5.81 per share.

(9) From February 2015 to the effective date of this registration statement, the Registrant granted stock options under its 2015 equity incentive plan to purchase up to an aggregate of shares of common stock to its employees, directors and consultants, at a weighted-average exercise price of $ per share. Through the effective date of this registration statement, shares of common stock were issued upon the exercise of options granted to certain employees, directors and consultants and the payment of $ to the Registrant was made.

The offers, sales and issuances of the securities described in this Item 15 were deemed to be exempt from registration under the Securities Act under either (i) Rule 701 promulgated under the Securities Act as offers and sale of securities pursuant to certain compensatory benefit plans and contracts relating to compensation in compliance with Rule 701 or (ii) Section 4(a)(2) of the Securities Act (and Regulation D promulgated thereunder) as transactions by an issuer not involving any public offering. The recipients of securities in each of

these transactions represented their intention to acquire the securities for investment only and not with view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the stock certificates and instruments issued in such transactions.

Item 16. Exhibits and financial statement schedules.

(a) Exhibits.

The exhibits listed below are filed as part of this registration statement.

EXHIBIT NUMBER	DESCRIPTION OF DOCUMENT
1.1†	Form of Underwriting Agreement.
2.1††#	Asset Contribution Agreement, by and between the Registrant and Transposagen Biopharmaceuticals, Inc., dated February 9, 2015.
2.2††#	Agreement and Plan of Merger and Reorganization, by and among the Registrant, Hermes Merger Sub I, Inc., Hermes Merger Sub II, LLC, Vindico NanoBioTechnology, LLC and Christopher Young as Stockholders' Representative, dated as of October 10, 2016, as amended on July 24, 2018.
3.1#	Amended and Restated Certificate of Incorporation, as amended, as currently in effect.
3.2†	Form of Amended and Restated Certificate of Incorporation to become effective immediately prior to the completion of this offering.
3.3#	Bylaws, as currently in effect.
3.4†	Form of Amended and Restated Bylaws to become effective upon the completion of this offering.
4.1†	Form of Common Stock Certificate of the Registrant.
4.2#	Amended and Restated Investors' Rights Agreement, by and between the Registrant and certain of its stockholders, dated March 19, 2018.
4.3#	Form of Warrant issued to Oxford Finance LLC, dated July 25, 2017.
4.4#	Form of Warrant issued to Oxford Finance LLC, dated August 13, 2018.
5.1†	Opinion of Cooley LLP.
10.1+†	Form of Indemnity Agreement, by and between the Registrant and its directors and officers.
10.2+†	Poseida Therapeutics, Inc. 2015 Equity Incentive Plan, as amended, and Forms of Option Grant Notice, Option Agreement and Notice of Exercise thereunder.
10.3+†	Poseida Therapeutics, Inc. 2018 Equity Incentive Plan and Forms of Stock Option Grant Notice, Option Agreement and Notice of Exercise thereunder.
10.4+†	Poseida Therapeutics, Inc. 2018 Employee Stock Purchase Plan.
10.5+†	Poseida Therapeutics, Inc. Non-Employee Director Compensation Policy.
10.6+†	Executive Employment Agreement, by and between the Registrant and Eric Ostertag, dated June 1, 2015.
10.7+†	Executive Employment Agreement, by and between the Registrant and Nishan de Silva, dated June 1, 2015.
10.8+†	Executive Employment Agreement, by and between the Registrant and Mark Gergen, dated February 19, 2018.

EXHIBIT NUMBER	DESCRIPTION OF DOCUMENT
10.9*#	License Agreement, by and between the Registrant and Janssen Biotech, Inc., effective August 3, 2015.
10.10*#	Commercial License Agreement, by and between the Registrant and TeneoBio, Inc., effective April 27, 2017.
10.11*#	Commercial License Agreement, by and between the Registrant and TeneoBio, Inc., effective August 3, 2018.
10.12*	License Agreement, by and between the Registrant and Helmholtz-Zentrum München—Deutsches Forschungszentrum für Gesundheit und Umwelt GmbH, effective May 20, 2016.
10.13#	Loan and Security Agreement, by and among the Registrant, Vindico NanoBioTechnology LLC and Oxford Finance LLC, dated July 25, 2017, as amended on May 15, 2018 and August 13, 2018.
10.14#	Lease, by and between the Registrant and AP3-SD1 Campus Point LLC, dated March 3, 2016, as amended on July 6, 2016 and November 4, 2016.
10.15#	Lease, by and between the Registrant and BMR-9360-9390 Towne Centre LP, dated October 1, 2018.
21.1#	Subsidiaries of the Registrant.
23.1†	Consent of Independent Registered Public Accounting Firm.
23.2†	Consent of Cooley LLP. Reference is made to Exhibit 5.1.
24.1	Power of Attorney. Reference is made to the signature page hereto.

† To be filed by amendment.
†† Schedules have been omitted pursuant to Item 601(b)(2) of Regulation S-K. The Registrant undertakes to furnish supplemental copies of any of the omitted schedules upon request by the SEC.
+ Indicates management contract or compensatory plan.
* Confidential treatment has been requested with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.
# Previously filed.

(b) Financial Statement Schedules.

No financial statement schedules are provided because the information called for is not required or is shown either in the consolidated financial statements or related notes.

Item 17. Undertakings.

The Registrant hereby undertakes to provide to the underwriters at the closing specified in the underwriting agreement certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 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 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 Act and will be governed by the final adjudication of such issue.

The undersigned Registrant hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act of 1933, 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 of 1933, 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.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant has duly caused this Registration Statement on Form S-1 to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of San Diego, State of California, on the day of , 2018.

POSEIDA THERAPEUTICS, INC.

Eric Ostertag, M.D., Ph.D.
President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Eric Ostertag and Mark J. Gergen and each of them as his true and lawful attorneys-in-fact and agents, each with the full power of substitution, for him in his name, place or stead, in any and all capacities, to sign any and all amendments to this Registration Statement (including post-effective amendments), and to sign any registration statement for the same offering covered by this Registration Statement that is to be effective upon filing pursuant to Rule 462(b) promulgated under the Securities Act of 1933, and all post-effective amendments thereto, and to file the same, with 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 and necessary to be done in and about the premises, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming that said attorneys-in-fact and agents, or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act, this Registration Statement has been signed by the following persons in the capacities and on the dates indicated.

SIGNATURE	TITLE	DATE
Eric Ostertag, M.D., Ph.D.	President, Chief Executive Officer and Director *(Principal Executive Officer)*	, 2018
Mark J. Gergen	Chief Business and Financial Officer and Director *(Principal Financial Officer)*	, 2018
Johanna M. Mylet	Vice President, Finance *(Principal Accounting Officer)*	, 2018
David Hirsch, M.D., Ph.D.	Director	, 2018
Sean Murphy	Director	, 2018
John Schmid	Director	, 2018

Exhibit 10.12

*****Certain confidential information contained in this document, marked by brackets, has been omitted and filed separately with the Securities and Exchange Commission pursuant to Rule 406 of the Securities Act of 1933, as amended.**

Execution Version

LICENSE AGREEMENT

between

Helmholtz-Zentrum München - Deutsches Forschungszentrum für Gesundheit und Umwelt GmbH

Ingolstädter Landstraße 1
85764 Neuherberg
Germany

– in the following: "**HMGU**" –

and

Poseida Therapeutics, Inc.
4250 Executive Square, Suite 900
La Jolla, CA 92037
U.S.A.

– in the following: "**POSEIDA**" or "**LICENSEE**" –

– The LICENSEE and HMGU individually a "Party" and collectively the "Parties" –

Preamble

HMGU is a public research institution operating in the field of environmental health. Researchers at HMGU identified the endonuclease "Clo51" from the bacterial strain […***…] as an enzyme that can be used for genome editing purposes (hereinafter referred to as the "ORIGINAL MATERIAL") as described in Annex 1. The technology involving the ORIGINAL MATERIAL is protected by the […***…].

LICENSEE is a cell and gene therapy company developing human therapeutics based on its proprietary genome editing technologies.

On June 2, 2015, HMGU, LICENSEE, Transposagen Biopharmaceuticals, Inc. ("TRANSPOSAGEN"), and Hera Testing Laboratories, Inc. ("HERA") concluded a Material Transfer and Option Agreement (the "OPTION AGREEMENT"), by means of which HMGU granted the LICENSEE, TRANSPOSAGEN and HERA access to the ORIGINAL MATERIAL for purposes of evaluating it, as well as an option for an exclusive commercial license to the PATENT RIGHTS (the "OPTION").

The LICENSEE, TRANSPOSAGEN and HERA have evaluated the ORIGINAL MATERIAL and have exercised the OPTION as stipulated in the OPTION AGREEMENT. HMGU is willing to grant licenses accordingly. Concurrent with the execution of this Agreement, TRANSPOSAGEN and HMGU are entering into a license agreement (the "TRANSPOSAGEN AGREEMENT") and HERA and HMGU are entering into a license agreement (the "HERA AGREEMENT").

Now, therefore, the Parties agree as follows:

§ 1 Definitions

1.1 "COMBINATION PRODUCT" means […***…]. The other active ingredient(s) in clause (a) and the other pharmaceutical product(s) in clause (b) are each referred to as the "Other Product(s)".

1.2 "CONFIDENTIAL INFORMATION": The term 'CONFIDENTIAL INFORMATION' shall mean any information, data or substance exchanged among the Parties under this Agreement, irrespective of the form of transmission (e.g. orally, in written form, electronically).

1.3 "CONTRACT YEAR": The term 'CONTRACT YEAR' shall mean a calendar year. The first CONTRACT YEAR shall run from the EFFECTIVE DATE to the end of the respective calendar year.

1.4 "EFFECTIVE DATE" shall be the date on which this Agreement is signed by the last Party.

1.5 "LICENSED PRODUCT": The term 'LICENSED PRODUCT' shall mean any product which itself or the production of which, absent the license granted hereunder, would infringe at least one Valid Claim. "Valid Claim" shall be a claim of (a) a patent covered by the definition of PATENT RIGHTS, or (b) a claim of a published pending patent application within the scope of PATENT RIGHTS, provided that

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such application confers provisional protection and has not been withdrawn, abandoned or finally rejected without possibility of appeal or re-filing.

1.6 “LICENSED SERVICE” shall mean any service which, absent the license granted hereunder, would infringe at least one Valid Claim as defined in Section 1.5.

1.7 “MATERIAL” comprises ORIGINAL MATERIAL, PROGENY, UNMODIFIED DERIVATIVES and MODIFICATIONS.

1.8 “MODIFICATIONS” are modifications of the ORIGINAL MATERIAL, PROGENY and/or UNMODIFIED DERIVATIVES which contain or incorporate ORIGINAL MATERIAL, PROGENY and/or UNMODIFIED DERIVATIVES, in whole or in part.

1.9 “NET SALES” shall mean the gross amount invoiced by LICENSEE or sublicensees on account of a first sale or other commercial use of LICENSED PRODUCTS and LICENSED SERVICES, less the following deductions:

[…***…]

If first sale is made to a third party which is an Affiliate of a sublicensee of a LICENSEE or of a LICENSEE, the invoice price shall be adjusted in order to reflect the invoice price of transactions with a non-affiliated third party. “Affiliates” within the meaning of this paragraph shall be any legal entities that (directly or indirectly) control, are controlled by, or are under common control with a Party, whereby the controlling entity controls at least 50 per cent of the voting equity interests.

As used in this Agreement, first sale or other commercial use shall not include use of LICENSED PRODUCTS or LICENSED SERVICES for use in clinical study purposes or compassionate use programs.

NET SALES of a COMBINATION PRODUCT shall be calculated as follows:

[…***…]

1.10 “ORIGINAL MATERIAL” comprises plasmid DNA as described in Annex 1.

1.11 “PATENT RIGHTS” shall mean […***…], including any patents issuing from such patent applications and any applications or patents based upon any of such patent applications or patents, as well as any continuations, divisions, re-examinations, reissues, substitutes, renewals, extensions, supplementary protection certificates of any of the foregoing patent applications or patents.

1.12 “FIELD” shall be all fields and uses (products, services, technologies) except for

[…***…]

1.13 “PROGENY” is the next and all other generations of the ORIGINAL MATERIAL, which come into being by any sort of biological or chemical reproduction, including but not limited to sexual, asexual and artificial reproduction, e.g. descendants of rats/mice or cells which are produced by cell division.

1.14 “UNMODIFIED DERIVATIVES” are substances which constitute an unmodified functional subunit or product expressed by the ORIGINAL MATERIAL and/or PROGENY, e.g. subclones of unmodified cell lines, purified or fractionated subsets of the ORIGINAL MATERIAL or proteins expressed by DNA/RNA.

§ 2 Use of MATERIAL by LICENSEE

2.1 The LICENSEE has already obtained ORIGINAL MATERIAL from HMGU pursuant to the OPTION AGREEMENT. HMGU shall be and remain owner of the ORIGINAL MATERIAL.

2.2 The LICENSEE shall use the ORIGINAL MATERIAL in compliance with all laws and regulations applicable in the LICENSEE’S place and country, including guidelines for work with recombinant DNA. The ORIGINAL MATERIAL is experimental in nature and shall not be used in animals, unless - where applicable - explicitly admitted by an ethics committee or regulations on the treatment of laboratory animals, and not in humans.

2.3 The LICENSEE shall have the right to use the MATERIAL in its FIELD in order to exercise (and consistent with) the license granted in Section 3.1 below. In case of sublicensing according to Section 3.2 below, each sublicensee shall have the right to use the MATERIAL solely in order to exercise the sublicense. Third party contractors and service providers performing services on behalf of LICENSEE shall have the right to use the MATERIAL solely in order to perform services for LICENSEE consistent with the license granted in Section 3.1 below. For clarity, LICENSEE shall have the right to sell LICENSED PRODUCTS to third parties in accordance with the license granted in Section 3.1 below.

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2.4 Upon any early termination of this Agreement, the LICENSEE shall immediately refrain from using the MATERIAL to the extent covered by an issued patent within the PATENT RIGHTS and shall destroy or transfer to HMGU at HMGU's request the foregoing MATERIAL in its possession at the time of the termination or request respectively. Such destruction and nonuse shall be immediately confirmed to HMGU. Upon any early termination of this Agreement, end users that purchased LICENSED PRODUCTS prior to such termination shall not be obligated to return any MATERIAL embedded within the LICENSED PRODUCT.

2.5 In case of early termination with a patent for a certain jurisdiction within the PATENT RIGHTS not yet being issued, when and if a patent within such jurisdiction within the PATENT RIGHTS issues, LICENSEE shall pay […***…] remuneration, retroactively upon grant of the respective patent. Such remuneration shall cover LICENSEE's commercial use of the MATERIAL from the day of effectiveness of termination until grant of the respective patent.

It is understood that LICENSEE is not allowed to sell or otherwise commercially use the MATERIAL covered by an issued patent within the PATENT RIGHTS, from the day the respective patent is issued, without a respective license from HMGU.

2.6 Upon expiration of this Agreement, the LICENSEE shall continue to have the right to use the MATERIAL in its possession.

§ 3 License Grant

3.1 HMGU hereby grants LICENSEE the exclusive right to use and practice the PATENT RIGHTS in order to research, develop, make, use, offer for sale and sell LICENSED PRODUCTS and LICENSED SERVICES in the FIELD.

3.2 LICENSEE may sublicense the rights granted to it in Section 3.1 to third parties through multiple tiers, provided that in each case the respective sublicensee assumes all obligations of the LICENSEE under this agreement in a written statement to HMGU, in particular reporting and payment obligations while leaving LICENSEE's obligations unaffected; with regard to financial obligations, the respective LICENSEE's and sublicensee's obligations shall be joint and several. In addition, LICENSEE may grant non-exclusive research licenses, i.e. for further development and/or improvement of existing and/or for the development of novel LICENSED PRODUCTS, to TRANSPOSAGEN or HERA, provided that such sublicense shall ensure that the payments to HMGU are equal to the payments the sublicensee would have to make to HMGU if it was a direct licensee of HMGU with respect to the subject matter of the research license. LICENSEE will inform HMGU about ongoing negotiations with a potential sublicensee and will forward a copy of any sublicense agreement to HMGU subject to the right to redact sensitive information within such agreement that is not necessary for HMGU to enforce its rights hereunder. LICENSEE will remain responsible for each of its respective sublicensees' compliance with the terms of this Agreement as well as sub-sublicensees' compliance with the terms of this Agreement through applicable tiers.

3.3 HMGU retains a free of charge, non-exclusive, sublicensable and irrevocable right to use the PATENT RIGHTS for non-commercial research purposes, including in research collaborations with academic and commercial partners. HMGU may also provide the ORIGINAL MATERIAL to third parties for non-commercial research purposes, including in research cooperations with not-for-profit institutions and companies on the basis of a research MTA. The LICENSEE acknowledges that the

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inventor […***…] has been granted the right to use the MATERIAL for his research at […***…].

3.4 (i) LICENSEE shall use […***…] efforts to develop or have developed at least one LICENSED PRODUCT and/or LICENSED SERVICE, as the case may be, and to obtain the necessary regulatory approvals in the major market countries (US, EU) as far as required and to market and sell LICENSED PRODUCTS and/or LICENSED SERVICES.

(ii) Within […***…] from the EFFECTIVE DATE, LICENSEE shall obtain a preclinical proof of principle demonstrating that the Clo51-technology is suitable for cell or gene therapy approaches. In case the preclinical proof of principle cannot be demonstrated by LICENSEE within the abovementioned period, LICENSEE and HMGU shall discuss amicably possible measures to overcome the respective problems.

(iii) In addition, LICENSEE shall have initiated a phase I/II clinical study involving the Clo51-technology within […***…] years after the EFFECTIVE DATE. HMGU is allowed to change the exclusive license to the PATENT RIGHTS to a non-exclusive license by written notice to LICENSEE, if LICENSEE cannot achieve clinical use of the Clo51-technology within the aforementioned time.

3.5 On March 1st of each CONTRACT YEAR, LICENSEE shall submit to HMGU a written report specifically stating the measures taken and the progress made in order to achieve the development goals defined in Section 3.4.

3.6 LICENSEE hereby grants to HMGU a non-exclusive, royalty-free, non-sublicensable, non-transferrable, non-commercial research license, including for research use in co-operations with other universities or research institutions, to new developments, modifications and improvements of the technology covered by the PATENT RIGHTS, to the extent such new developments, modifications or improvements could not be practiced without the PATENT RIGHTS and are created by LICENSEE or any of its sublicensees; provided, that such license will not include rights to commercially use LICENSED PRODUCTS or LICENSED SERVICES themselves.

§ 4 Remuneration

4.1 As remuneration for the rights granted in § 3, LICENSEE shall pay to HMGU an execution fee, annual maintenance fees, royalties and milestone fees. Except as expressly stated in this Agreement, none of the payments shall be credited to any other payment. All payments are non-refundable.

4.2 License Execution Fee

For execution of this Agreement, LICENSEE shall pay to HMGU € 10,000.00. Payment of the execution fee shall be due […***…] after the EFFECTIVE DATE and receipt of an invoice.

4.3 Annual Maintenance Fee

LICENSEE shall pay to HMGU an annual maintenance fee of € […***…] for each CONTRACT YEAR. The maintenance fee shall be credited against royalties due for the same CONTRACT YEAR. The maintenance fee for the first CONTRACT YEAR shall be due […***…] after the EFFECTIVE DATE and shall be calculated pro rata based upon the number of months in which this Agreement will be effective during that CONTRACT YEAR. The annual maintenance fees will be invoiced by HMGU at

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the end of January of each CONTRACT YEAR and shall be paid by LICENSEE within […***…] after receipt of the invoice.

4.4 Royalties

LICENSEE shall pay royalties to HMGU during the Royalty Term (defined below), on a country by country basis for a LICENSED PRODUCT and/or LICENSED SERVICES sold by LICENSEE (with sales by a sublicensee of a LICENSEE governed by Section 4.7), according to the following scheme:

4.4.1 For sale or other commercial use of LICENSED PRODUCTS and LICENSED SERVICES except therapeutics and therapeutic use (hereinafter "CATEGORY A"):

a) Products: […***…]% on NET SALES; and

b) Services: […***…]% on NET SALES.

4.4.2 For LICENSED PRODUCTS which are therapeutics (human or veterinary) and LICENSED SERVICES for therapeutic use (human or veterinary) (hereinafter "CATEGORY B"):

a) Clo51 nuclease is part of the therapeutic agent (e.g. CRISPR-Clo51 gene therapy): […***…]% on NET SALES; and

b) Clo51 nuclease is not part of the therapeutic agent but was used to generate the therapeutic agent (e.g. cell therapy): […***…]% on NET SALES.

The Royalty Term for a country shall mean the period commencing on first commercial sale or other commercial use in such country and ending on the expiry of the last to expire VALID CLAIM in such country. For clarity, royalties payable by LICENSEE in respect of any sublicensee sales is covered by Section 4.7.

4.5 Due Date for payment of royalties

Royalties shall be due annually, […***…] after the end of a CONTRACT YEAR during the Royalty Term. If this Agreement is terminated before the end of a CONTRACT YEAR, the royalties shall be due […***…] after termination has become effective.

4.6 Milestones

4.6.1 LICENSEE shall make the following one-time milestone payments to HMGU upon first achievement of each of the following events for the first LICENSED PRODUCT where the Clo51 nuclease is part of the therapeutic agent (e.g., CRISPR-Clo51 gene therapy):

a) € […***…]

Beginning of a clinical phase I trial for a LICENSED PRODUCT;

b) € […***…]

Beginning of a clinical phase II trial for a LICENSED PRODUCT;

c) € […***…]

Beginning of a clinical phase III trial for a LICENSED PRODUCT;

In case of a), b) and c), "Beginning" shall mean the first treatment of a patient with a LICENSED PRODUCT;

d) € […***…]

Approval in USA; and

e) € […***…]

Approval in Europe.

4.6.2 LICENSEE shall make the following one-time milestone payments to HMGU upon first achievement of each of the following events with respect to the first LICENSED PRODUCT where the Clo51 nuclease is not part of the therapeutic (e.g. T-cell therapy):

a) € […***…]

Beginning of a clinical phase I trial for a LICENSED PRODUCT

b) € […***…]

Beginning of a clinical phase II trial for a LICENSED PRODUCT;

c) € […***…]

Beginning of a clinical phase III trial for a LICENSED PRODUCT.

In case of a), b) and c), "Beginning" shall mean the first treatment of a patient with a LICENSED PRODUCT;

d) € […***…]

Approval in USA; and

e) € […***…] Approval in Europe.

4.6.3 All Milestone payments become due irrespective of whether the respective milestone has been reached by LICENSEE or any of its sublicensees. A milestone event shall also have occurred if a collaboration partner of LICENSEE or a sublicensee of LICENSEE (in each case to whom rights have been provided to LICENSED PRODUCTS and/or in case the respective LICENSED PRODUCTS have been produced by or on behalf of LICENSEE or a sublicensee of LICENSEE) is conducting the clinical trial or achieving the approval, as the case may be, on behalf of or under control of LICENSEE or a sublicensee of LICENSEE.

4.6.4 LICENSEE will inform HMGU immediately in writing when one of the milestones has been reached. Milestone payments are due within […***…] after the milestone has been reached. HMGU may and – upon request by LICENSEE – shall issue an invoice for such payment.

4.7 In case of sublicensing, LICENSEE shall pay to HMGU

4.7.1 For CATEGORY A:

a) In case of sales or other commercial use of a LICENSED PRODUCT by a sublicensee, […***…]% on NET SALES invoiced by sublicensee; and

b) In case of sales or other commercial use of a LICENSED SERVICE by a sublicensee, […***…]% on NET SALES invoiced by sublicensee; and

c) […***…]% of other payments (execution fee, milestones, payments in consideration of the issuance of equity, etc., but excluding royalty payments, loans, profit sharing payments (so long as LICENSEE pays the NET SALES royalties in Section 4.4 on LICENSED PRODUCT and/or LICENSED SERVICE NET SALES), cost-covering supply reimbursement and cost-covering reimbursements for research or development activities) received by LICENSEE from a sublicensee as a quid pro quo for the grant of the sublicense (hereinafter "Other Payments")

4.7.2 For CATEGORY B:

a) If Clo51 nuclease is part of the therapeutic agent:

i) In case of sales or other commercial use of a LICENSED PRODUCT or a LICENSED SERVICE by a sublicensee, […***…]% on NET SALES invoiced by sublicensee; and

ii) […***…]% of Other Payments.

b) If Clo51 nuclease is not part of the therapeutic agent but was used to generate the agent:

i) In case of sales or other commercial use of a LICENSED PRODUCT or a LICENSED SERVICE by a sublicensee, […***…]% on NET SALES invoiced by sublicensee; and

ii) […***…]% of Other Payments.

4.8 All payments under this § 4 shall be made to the following account:

Account holder:	Ascenion GmbH
Bank name:	Commerzbank Muenchen
SWIFT CODE	[***]
IBAN (Account Number)	[***]

HMGU has authorized Ascenion GmbH to collect and receive the payments which become due under this Agreement.

4.9 Notwithstanding other rights of HMGU, late payments will be charged with a fee at the annual rate of […***…].

4.10 On all payments under this § 4, the LICENSEE will pay VAT in the statutory amount should VAT apply.

§ 5 Accounts, Reporting and Audits

5.1 LICENSEE shall keep, and shall cause its sublicensees to keep, complete and accurate records according to general accounting principles and containing all the data reasonably required for the full computation and verification of the payments to be made under § 4. As part of the records, LICENSEE will keep for a period of […***…] years originals or copies of the invoices sent to its sublicensees and/or purchasers/recipients of LICENSED PRODUCTS and LICENSED SERVICES.

5.2 HMGU is entitled to inspect LICENSEE'S records and to direct the LICENSEE to inspect any of its sublicensees' records, with […***…] prior written notice not more than […***…] a year during business hours, by an independent auditor or other member of a profession which is under a professional duty of confidentiality, elected by HMGU. The cost of such inspection shall be borne by HMGU. If the inspection shows that the payments made by LICENSEE differ to HMGU's disadvantage by more than […***…]% ([…***…] percent) from the payments which were actually due, the LICENSEE shall bear the costs of the inspection.

5.3 Annually, within […***…] after the end of each half CONTRACT YEAR, LICENSEE shall forward to HMGU a report reflecting the payments due under § 4 on a LICENSED PRODUCT-by-LICENSED PRODUCT, LICENSED SERVICE-by-LICENSED SERVICE and country-by-country basis. The report shall state all transactions with each purchaser/recipient of LICENSED PRODUCTS and/or LICENSED SERVICES and each of the LICENSEE'S licensees, showing the NET SALES (whichever is relevant for the calculation of remuneration/royalties) attributed to the transaction. If no payment is due, a report certifying this shall be supplied. If this Agreement is terminated before the end of a CONTRACT YEAR, the report shall be due within […***…] after the termination has become effective. The correctness and completeness of the report shall be certified by LICENSEE's chief financial officer.

§ 6 Ownership; Patent Filing, Prosecution and Litigation

6.1 HMGU remains owner of the PATENT RIGHTS, irrespective of their use by the LICENSEE, and the patent records remain in the name of HMGU as applicant. Unless HMGU notifies LICENSEE otherwise in writing (Email is sufficient), HMGU authorizes LICENSEE to conduct patent prosecution, maintenance and patenting strategy within its own reasonable discretion but in cooperation with HMGU.

LICENSEE shall inform HMGU about important filings, prosecution and maintenance measures. LICENSEE acknowledges that LICENSEE, TRANSPOSAGEN and HERA are jointly and severally liable for paying the costs of filing, prosecuting, maintaining and defending the PATENT RIGHTS. Therefore, LICENSEE shall bear one third (1/3) of the costs of filing, prosecuting, maintaining and defending the PATENT RIGHTS as long as each of TRANSPOSAGEN and HERA also bear one third (1/3) of such costs.

6.2 With advance written notice to HMGU of at least […***…] and respective information to TRANSPOSAGEN and HERA in due time, LICENSEE may decide not to pay further prosecution or maintenance cost of a patent and/or patent application included within PATENT RIGHTS in any national jurisdiction(s).

6.3 In case TRANSPOSAGEN and/or HERA make a decision subject to the respective Section 6.2 in the TRANSPOSAGEN AGREEMENT or the HERA AGREEMENT, LICENSEE will continue to pay such cost for this/these jurisdiction(s) according to the adjusted cost split (alternatively, half the cost in case of TRANSPOSAGEN or HERA make such decision and full cost in case of TRANSPOSAGEN and HERA make such decision) starting […***…] after original notice of TRANSPOSAGEN and/or HERA, as the case may be, to HMGU.

If LICENSEE, TRANSPOSAGEN and HERA each make such a decision, HMGU may decide by written notice to LICENSEE, TRANSPOSAGEN and HERA to (i) abandon prosecution or maintenance of that patent and/or patent application within such jurisdiction(s) or (ii) pursue prosecution or maintenance of that patent and/or patent application within such jurisdiction(s) at its own cost with LICENSEE, TRANSPOSAGEN and HERA having no further rights in and to that particular patent application or patent within such national jurisdiction(s) and HMGU being entitled to otherwise commercialize such patent application or patent, or (iii) pursue prosecution or maintenance of that patent and/or patent application within such jurisdiction(s) at its own cost with such PATENT RIGHT to remain covered by this Agreement.

6.4 A Party becoming aware of an infringement or other unauthorized uses of a PATENT RIGHT by any third party shall immediately inform the other Party in writing. Generally, LICENSEE shall be entitled to take all reasonable actions to prevent or enjoin any unauthorized use of a PATENT RIGHT at its own risk and expense in the FIELD, and HMGU, upon request and at the cost of LICENSEE, shall provide such assistance as LICENSEE may reasonably request. HMGU shall be entitled to join proceedings instituted by LICENSEE. Any recovery obtained in the course of defense of the PATENT RIGHTS shall first be used to refund any out-of-pocket expenses, including attorney costs, incurred by the LICENSEE and, where applicable, HMGU in bringing such action. The remaining recovery, if any, shall remain with the LICENSEE but subject to a contribution of […***…]% to be paid to HMGU. In the event LICENSEE has not taken action against an alleged infringer within reasonable time after becoming aware of an infringement, but at the latest […***…] days before the expiry of any time limit whose observance is necessary in order not to prejudice the procedural situation in defending the PATENT RIGHT, HMGU may, but shall not be required to, take such action as HMGU may deem appropriate in order to prevent or enjoin the alleged infringement. In such case, HMGU shall act at its own risk and expense, and LICENSEE shall reasonably cooperate with HMGU. Any recovery obtained under sole action of HMGU shall […***…].

6.5 The provisions of Section 6.4 shall apply accordingly if a third party challenges the validity of a PATENT RIGHT, provided that if LICENSEE does not defend the respective PATENT RIGHT in due time at LICENSEE'S expense and the Parties

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cannot agree to defend jointly, HMGU has the right (but not the obligation) to defend the PATENT RIGHT and with respect to such PATENT RIGHT may determine in its sole discretion to exclude the PATENT RIGHT from the license granted in this Agreement or leave the PATENT RIGHT under the license granted to LICENSEE in which case the royalty rate for LICENSED PRODUCTS and LICENSED SERVICES distributed in the respective country shall increase by […***…] % until HMGU's expenses incurred within the course of defense of the PATENT RIGHT have been reimbursed.

§ 7 Representations, Warranties and Indemnification

7.1 The LICENSEE shall use the MATERIAL and the PATENT RIGHTS at its own risk. All claims based on legal or other defects of the MATERIAL and/or PATENT RIGHTS shall be excluded. In particular, HMGU is not liable if the use of the MATERIAL and/or PATENT RIGHTS infringes the rights of third parties or if the inventions which are the subject matter of the PATENT RIGHTS are not patentable.

7.2 HMGU declares that, to the best of its knowledge as of the EFFECTIVE DATE, (a) it is the sole owner of the PATENT RIGHTS, (b) it has not previously assigned, conveyed or otherwise encumbered its right, title and interest in the PATENT RIGHTS in a manner that would make grant of the licenses hereunder legally impossible and (c) it has the right to grant the license rights herein. HMGU makes no representation or warranty – whether express or implied – as to the operability or fitness for any use, safety, efficacy, approvability by regulatory authorities, time and cost of development and/or breadth of the technology covered by the PATENT RIGHTS.

7.3 In any case of liability for damages among the Parties, such liability is limited to foreseeable damages. Liability for lost profits is excluded. Except as stipulated in Sections 3.2, 6.1 and 6.3 above, the obligation and liabilities of LICENSEE (including, without limitation, payment and indemnification) under this Agreement shall be sole (and not joint and several) with respect to the acts or omissions of LICENSEE.

7.4 LICENSEE indemnifies and holds HMGU harmless from any liability and all claims arising from LICENSEE'S use of the MATERIAL and/or PATENT RIGHTS, including claims by third parties which are based on the allegation that such third party has been injured or harmed by a LICENSED PRODUCT and/or LICENSED SERVICE.

7.5 HMGU on one side and the LICENSEE on the other are not acting as agents or contractors for the respective other side. This Agreement shall not create a partnership among the Parties.

7.6 HMGU may not use the name of the LICENSEE and LICENSEE may not use HMGU's name for any advertisement or promotional purpose without the prior written consent of the respective other Party. However, the Parties or their technology transfer partners shall be entitled to issue a press release informing the public about the licenses granted hereunder without disclosing any CONFIDENTIAL INFORMATION belonging to the other Party or information that may harm the legitimate business interests of the other Party. Each Party will present to the other Party a draft Press Release within a reasonable time period but at least […***…] prior to the anticipated publication date. In case the other Party objects to the publication of the press release within […***…] from receipt, the Parties will amicably and expeditiously collaborate in order to find a version which suits both Parties' needs.

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§ 8 Confidentiality

8.1 A Party receiving CONFIDENTIAL INFORMATION (the "Receiving Party") from the other Party (the "Disclosing Party") will keep such CONFIDENTIAL INFORMATION confidential. In particular, the Receiving Party shall only use and reproduce such CONFIDENTIAL INFORMATION to the extent necessary in order to pursue the objectives of this Agreement. Furthermore, the Receiving Party shall not disclose CONFIDENTIAL INFORMATION to any third party; this includes disclosure under a confidentiality Agreement. Ascenion GmbH is not a third party with regard to HMGU as Receiving Party.

8.2 The Receiving Party shall disclose CONFIDENTIAL INFORMATION only to such officers and employees,

a) who strictly need to access such information in order to accomplish the objectives of this Agreement; and

b) who are under a confidentiality obligation that is at least as strict as the obligations set forth in this Agreement.

8.3 The obligations under Sections 8.1 and 8.2 above shall not extend to all or any part of the CONFIDENTIAL INFORMATION for which the Receiving Party can prove

a) that it was or became part of the public domain or publicly known without fault of the Receiving Party; or

b) that it was rightfully in the possession of the Receiving Party prior to the disclosure; or

c) that it was supplied to the Receiving Party by a third party which is not under a confidentiality obligation to Disclosing Party; or

d) that Receiving Party has to disclose in response to a valid order of a court or other governmental body or subdivision thereof, or whose disclosure is otherwise required by law or regulation (including the rules of any nationally recognized securities exchange); providing, however, that the Receiving Party shall have given reasonable prior notice to the Disclosing Party, and that the Receiving Party shall make a reasonable effort to obtain a protective order requiring that the CONFIDENTIAL INFORMATION so disclosed be limited to information necessarily responsive to the order issued.

8.4 After any termination or expiration of this Agreement, the Receiving Party shall – upon instruction by the Disclosing Party – return to the Disclosing Party or destroy any document or data carrier containing CONFIDENTIAL INFORMATION in its possession. If the Disclosing Party gives no instruction, the Receiving Party shall destroy any document or data carrier containing CONFIDENTIAL INFORMATION […***…] after any termination or expiration of this Agreement. However, one (1) copy of CONFIDENTIAL INFORMATION and automatically generated electronic backup copies may be retained in a secure location for the sole purpose of determining compliance with ongoing obligations under this Agreement.

8.5 The Parties' obligations under this § 8 shall extend for a period of […***…] years after any termination or expiration of this Agreement.

§ 9 Termination

9.1 This Agreement shall come into force as of the EFFECTIVE DATE and shall run until the requirement to pay royalties under § 4 above ends, subject only to one of the reasons for termination mentioned below. Upon expiration of this Agreement, LICENSEE shall have the right to continue to use the MATERIAL as set forth in Section 2.6.

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9.2 Each Party shall have the right to terminate this Agreement following any material breach by the other Party, if the breach is not cured within six (6) weeks after notice by the non-breaching Party. A material breach by LICENSEE shall include (without limitation) the following:

a) breach of the development obligation under Section 3.4,

b) non-payment of the license fees mentioned in § 4,

c) non-delivery of the reports mentioned in Section 4.6.4 or Section 5.3,

d) breach of payment obligation under Section 6.1, or

e) challenge of the validity of a PATENT RIGHT or support of third parties in challenging the validity of a PATENT RIGHT.

However, before being entitled to termination as to a), HMGU has to allow LICENSEE to cure the breach within six months after receipt of a notice sent by HMGU.

9.3 LICENSEE shall, without undue delay, notify HMGU in writing in case it runs into substantial financial difficulties which are so substantial that a reasonable CEO would consider filing for insolvency proceedings over all or substantially all of the LICENSEE's assets within the following weeks. In such a case, HMGU has the right to terminate this Agreement vis-à-vis the LICENSEE.

9.4 LICENSEE has the right to terminate this Agreement with three months' notice to the end of a calendar year; provided, that, if LICENSEE terminates this Agreement prior to December 31, 2018, then LICENSEE shall pay HMGU a termination fee equal to twenty thousand Euros (20,000 €).

9.5 A notice of termination has to be in writing to be valid.

9.6 This Agreement shall end automatically to the extent permitted under applicable law if LICENSEE becomes subject to insolvency proceedings, or if LICENSEE undergoes voluntary or involuntary dissolution or suffers the appointment of a receiver or trustee over all, or substantially all of its assets, in each case which case is not dismissed within two months after the commencement thereof.

9.7 Any termination of this Agreement shall not affect rights and obligation which have accrued while this Agreement was in effect. In particular, any termination of this Agreement shall not affect LICENSEE'S obligation to pay royalties and to allow book inspection (Section 5.2) with regard to payments which have become due while this Agreement has been in effect.

9.8 In the event of termination of this Agreement by HMGU according to Section 9.2 (i.e. for material breach by LICENSEE), provided that a particular sublicensee of LICENSEE did not cause the breach that resulted in such termination and is not in breach of the respective sublicensee agreement, such sublicensee shall, at its election, have the right to receive a direct license from HMGU under, at HMGU's election, either the terms and conditions of this Agreement, to the extent applicable to the scope of the sublicense granted to such sublicensee, or the terms and conditions of the sublicensing agreement between LICENSEE and the sublicensee, to the extent applicable to the scope of the PATENT RIGHTS sublicensed to such sublicensee.

9.9 Sections 2.2, 7.1, 7.3 and 7.4 shall survive termination or expiry of this Agreement for as long as LICENSEE has MATERIAL in its possession.

§ 10 Miscellaneous

10.1 Neither Party shall be entitled to assign this Agreement in its entirety to third parties; provided that a Party may assign any of its rights or delegate any of its obligations under this Agreement without the consent but with prior notification to the other Party to (i) its Affiliate(s) or subsidiary(ies) or (ii) its successor in interest in connection with any merger, acquisition, consolidation, or sale of all or substantially all of the assets of a party, provided that such assignee assumes in writing or under law all of the obligations of such Party hereunder. Except in connection with any sublicense and as expressly stated in this Agreement, neither Party shall be entitled to delegate obligations under this Agreement to third parties.

10.2 All communications under this Agreement shall be in writing and shall be mailed, hand delivered or faxed as follows, unless otherwise indicated by a Party in writing:

If to HMGU:

Helmholtz Zentrum München – Deutsches Forschungszentrum für Gesundheit und Umwelt GmbH
Attention of: Innovation Management, […***…]
Ingolstädter Landstraße 1
D-85764 Neuherberg

E-mail: […***…]
Fax: […***…]

If to POSEIDA:

Attention of: **Eric Ostertag, CEO**
4250 Executive Square, Suite 900
La Jolla, CA 92037
USA

E-mail: […***…]
Fax: […***…]

10.3 The invalidity or unenforceability of any provision of this Agreement shall not affect the validity or enforceability of any other provision hereof. In the place of the invalid provision, a valid provision is presumed to be agreed upon which comes economically closest to the one actually agreed upon.

10.4 General terms and conditions of the Parties do not apply to the Parties' relationship under this Agreement.

10.5 This Agreement contains the entire agreement of the Parties. There are no oral side agreements. The provisions of this Agreement cannot be changed, modified, amended or waived except by a written instrument signed by the Parties. This also applies to a waiver of this form provision.

10.6 This Agreement shall be governed by the laws of Germany with the exception of its conflict of law rules resulting in the application of a foreign jurisdiction and under exclusion of the UN Convention on the International Sale of Goods. For all controversies arising under this Agreement, the courts of the city of Munich, Germany shall have exclusive jurisdiction to which the Parties hereby irrevocably submit.

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This Agreement has been executed in two original versions, one belonging to each Party.

For and on behalf of HMGU

Signature	/s/ […***…]	*Place, Date*	Neuherberg 20.05.16
Name			
Affiliation			

Signature	/s/ […***…]	*Place, Date*	Neuherberg 20.05.16
Name			
Affiliation			

For and on behalf of POSEIDA

Signature	/s/ Eric Ostertag	*Place, Date*	5-10-16
Name	Eric Ostertag		
Affiliation	CEO		

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Annex 1: The ORIGINAL MATERIAL

Description of the ORIGINAL MATERIAL

[…***…]

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