BELLICUM PHARMACEUTICALS, INC
Form 10-K
March 12, 2019

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
Form 10-K
(Mark One)
x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018
OR
¨ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to
Commission file number 001-36783

Bellicum Pharmaceuticals, Inc.
(Exact name of registrant as specified in its charter)

Delaware	20-1450200
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

2130 W. Holcombe Blvd., Ste. 800, Houston, TX	77030
(Address of principal executive offices)	(Zip Code)

(832) 384-1100
(Registrant's telephone number, including area code)
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, par value $0.01 per share	The Nasdaq Global Market

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ¨ No x
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ¨ No x
Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes x No ¨

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§229.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes x No ¨
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ¨

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	x
Non-accelerated filer	¨	Smaller reporting company	x
		Emerging growth company	x

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. x

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ¨ No x

The approximate aggregate market value of the voting and non-voting common equity held by non-affiliates of the Registrant, based upon the last sale price of the common stock reported on The Nasdaq Global Market as of June 30, 2018 was $217,815,748 *

As of March 1, 2019, there were 44,320,559 shares of the Registrant's common stock, par value $0.01 per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Registrant’s definitive Proxy Statement relating to its 2019 Annual Meeting of Stockholders are incorporated by reference into Part III of this Annual Report on Form 10-K. Such Proxy Statement will be filed with the U.S. Securities and Exchange Commission within 120 days following the Registrant’s fiscal year ended December 31, 2018.

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*Excludes 13,831,891 shares of common stock held by directors and officers and by stockholders that the registrant concluded were affiliates of the Registrant as of June 30, 2018. Exclusion of such shares should not be construed to indicate that any such holder possesses the power, direct or indirect, to direct or cause the direction of the management or policies of the Registrant, or that such person is controlled by or under common control with the Registrant.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K, including the sections entitled "Business," "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations," may contain "forward-looking statements." We may, in some cases, use words such as "anticipate," "believe," "could," "estimate," "expect," "intend," "may," "plan," "pot "predict," "project," "should," "will," "would" or the negative of those terms, and similar expressions that convey uncertainty o future events or outcomes to identify these forward-looking statements. Any statements contained herein that are not statements of historical facts may be deemed to be forward-looking statements. Forward-looking statements in this Annual Report include, but are not limited to, statements about:

- the success, cost and timing of our product development activities and clinical trials;
- our ability to advance Chemical Induction of Dimerization, or CID, CID-based technologies, including CaspaCIDe and GoCAR-T;
- our ability to obtain and maintain regulatory approval of rivo-cel and any other product candidates, and any related restrictions, limitations and/or warnings in the label of an approved product candidate;
- our ability to obtain funding for our operations, including funding necessary to complete further development and commercialization of our product candidates;
- the commercialization of our product candidates, if approved;
- our plans to research, develop and commercialize our product candidates;
- our ability to attract collaborators with development, regulatory and commercialization expertise and the success of any such collaborations;
- future agreements with third parties in connection with the commercialization of our product candidates and any other approved product;
- the size and growth potential of the markets for our product candidates, and our ability to serve those markets;
- the rate and degree of market acceptance of our product candidates;
- regulatory developments in the United States, or U.S., and foreign countries;
- our ability to contract with third-party suppliers and manufacturers and their ability to perform adequately;
- the success of competing therapies that are or may become available;
- our ability to attract and retain key scientific or management personnel;
- our ability to grow our organization and increase the size of our facilities to meet our anticipated growth;
- the accuracy of our estimates regarding expenses, future revenue, capital requirements and needs for additional financing;
- our expectations regarding the period during which we qualify as an emerging growth company under the Jumpstart Our Business Startups Act of 2012, or the JOBS Act;
- our use of cash and other resources; and
- our expectations regarding our ability to obtain and maintain intellectual property protection for our product candidates.

These forward-looking statements reflect our management's beliefs and views with respect to future events and are based on estimates and assumptions as of the filing date of this Annual Report and are subject to risks and uncertainties. We discuss many of these risks in greater detail under the heading "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. Given these uncertainties, you should not place undue reliance on these forward-looking statements.

You should carefully read this Annual Report and the documents that we reference in this Annual Report completely and with the understanding that our actual future results may be materially different from what we expect. We qualify all of the forward-looking statements in this Annual Report by these cautionary statements.

Except as required by law, we undertake no obligation to update these forward-looking statements publicly, or to update the reasons that actual results could differ materially from those anticipated in any forward-looking statements, whether as a result of new information, future events or otherwise.

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ITEM 1. Business

Overview

We are a clinical stage biopharmaceutical company focused on discovering and developing novel cellular immunotherapies by modulating T cell function via controllable molecular switches. We are focused on developing treatments for various forms of cancer, including both hematological cancers and solid tumors, as well as orphan inherited blood disorders. We are using our proprietary Chemical Induction of Dimerization, or CID, technology platform to engineer our product candidates with switch technologies that are designed to control components of the immune system in real time. By incorporating our CID platform, our product candidates may offer better efficacy and safety outcomes than are seen with current cellular immunotherapies.

We are developing next-generation product candidates in some of the most important areas of cellular immunotherapy, including chimeric antigen receptor T cell therapy, or CAR-T and hematopoietic stem cell transplantation, or HSCT. CAR-T cell therapies are an innovative approach in which a patient's T cells are genetically modified to carry chimeric antigen receptors, or CARs. While high objective response rates have been reported in some hematological malignancies, CAR-T cells have shown limited clinical efficacy in solid tumors due to limited proliferation and persistence of these cells and to immune suppressive factors found in the tumor microenvironment. Patients treated with CAR-T cell therapies can have serious and sometimes fatal toxicities, which include instances in which the CAR-T cells have caused high levels of cytokines due to over-activation, referred to as "cytokine release syndrome," or CRS, neurologic toxicities and cases in which CAR-T cells have attacked healthy organs. In each case, these toxicities have sometimes resulted in death. HSCT, also known as bone marrow transplantation, has for decades been curative for many patients with hematological cancers or orphan inherited blood disorders. However, adoption of HSCT to date has been limited by the risks of transplant-related morbidity and mortality from graft-versus-host-disease, or GvHD, and the potential for serious infections or cancer recurrence due to the lack of an effective immune system following a transplant.

Our proprietary CID platform is designed to address these challenges. Events inside a cell are controlled by cascades of specialized signaling proteins. CID consists of molecular switches, modified forms of these signaling proteins, which are triggered inside the patient by infusion of a small molecule, instead of by natural upstream signals. We include these molecular switches in the appropriate immune cells and deliver the cells to the patient in the manner of conventional cellular immunotherapy. We have developed two such switches: an "activation switch," designed to stimulate activation, proliferation and persistence of the immunotherapy cells and a "safety switch," designed to initiate programmed cell death, or apoptosis, of the immunotherapy cells. Each of our product candidates incorporates one or both of these switches, for enhanced, real time control of efficacy and safety:

- Our iMC activation switch (also known as inducible MyD88/CD40) incorporated into our GoCAR-T™ product candidates is designed to enable control of the activation and proliferation of the T cells through the scheduled administration of a course of rimiducid infusions that may continue until the desired patient outcome is achieved. In the event of emergence of side effects, the level of activation of the GoCAR-T cells is designed to be attenuated by extending the interval between rimiducid doses, reducing the dosage per infusion, or suspending further rimiducid administration.
- Our CaspaCIDe™ safety switch (also known as inducible Caspase-9, or iC9) is incorporated into our rivo-cel product candidate, where it is inactive unless the patient experiences a serious side effect. In that event, a small molecule dimerizer (e.g., rimiducid or temsirolimus) is administered to induce Caspase-9 and eliminate a majority of the cells, with the goal of attenuating the therapy and resolving the serious side effect.
- In addition, we have an active research effort to develop other advanced molecular switch approaches, including a "dual-switch" GoCAR-T that is designed to provide a user-controlled system for managing proliferation, persistence and safety of tumor antigen-specific CAR T cells by incorporating both our iMC and CaspaCIDe switches, respectively.

By incorporating our novel switch technologies, we are developing product candidates with the potential to elicit positive clinical outcomes and ultimately change the treatment paradigm in various areas of cellular immunotherapy. Our clinical product candidates are described below.

Rivo-cel (rivogenlecleucel, formerly known as BPX-501) is a product candidate intended to improve HSCT outcomes in the treatment of hematologic malignancies, including leukemias, lymphomas, and inherited blood disorders. Rivo-cel, which contains our proprietary CaspaCIDe safety switch, is an allogeneic polyclonal T cell therapy that is designed to improve transplant outcomes following an HSCT procedure, including enhancing the recovery of the donor immune system, providing protection against infections, and in the case of malignancies, protection against disease relapse. In cases of severe or uncontrolled GvHD, which can occur as the primary risk of infusing donor T cells, elimination of a portion of the infused Rivo-cel product is possible through the activation of the CaspaCIDe safety switch.

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The European Commission has granted orphan drug designations to rivo-cel for treatment in HSCT, and for activator agent rimiducid for the treatment of GvHD. Additionally, rivo-cel and rimiducid have received orphan drug status from the U.S. Food and Drug Administration, or the FDA, as a combination replacement T cell therapy for the treatment of immunodeficiency and GvHD after allogeneic HSCT.

Based on interactions with the European Medicines Agency, or the EMA, we believe that data from the European arm of our BP-004 trial could form the basis of Marketing Authorisation Applications, or MAAs, for rivo-cel and rimiducid for pediatric patients with high-risk hematological cancers or certain orphan inherited blood disorders. In addition, the EMA's Committee for Medicinal Products for Human Use, or the CHMP, has agreed that review and approval under "exceptional circumstances" may be suitable, recognizing that a randomized trial may not be feasible in the pediatric haploidentical HSCT setting. In place of a randomized trial, we are collecting data from the C/CP-004 study, a concurrent observational study in pediatric patients receiving a matched unrelated donor HSCT. In addition, based on recent EMA feedback we are also planning to compare our BP-004 results to similar patients registered in the European Bone Marrow Transplant (EBMT) registry. We expect to report top-line results from the BP-004 clinical trial in the second quarter of 2019 and to file MAAs for European marketing approvals in 2019.

We are currently conducting a pivotal randomized Phase 2/3 global clinical trial, called THRIVE, for rivo-cel in adult and adolescent patients 12 years and older with intermediate and high-risk acute myeloid leukemia (AML) or myelodysplastic syndromes (MDS). The trial will compare the primary endpoint of overall survival in patients receiving a haplo-transplant with rivo-cel versus the standard post-transplant cyclophosphamide haplo-transplant regimen. We submitted and reviewed the protocol with the FDA during a Type C meeting and began screening patients for the trial in December of 2018.

- BPX-601 is an autologous GoCAR-T product candidate containing our proprietary iMC activation switch, designed to treat solid tumors expressing prostate stem cell antigen, or PSCA. We believe iMC enhances T cell proliferation and persistence, enhances host immune activity, and modulates the tumor microenvironment to improve the potential to treat solid tumors compared to traditional CAR-T therapies. A Phase 1/2 clinical trial, called BP-012, in patients with pancreatic, gastric, or prostate cancers expressing PSCA is ongoing and we expect to report updated data from this clinical trial in 2019.

- BPX-603 is a dual-switch GoCAR-T product candidate containing both the iMC activation and CaspaCIDe safety switches. BPX-603 is Bellicum's first controllable dual-switch GoCAR-T product candidate and is designed to target solid tumors that express the human epidermal growth factor receptor 2 antigen, or HER2. We expect to submit an IND for BPX-603 and to initiate a clinical trial in 2019.

- BPX-802 is a dual-switch GoCAR-T product candidate containing both the iMC and CaspaCIDe switches. BPX-802 is designed to target an antigen expressed in hematological malignancies. We expect to submit an IND for BPX-802 in late 2019.

We have developed efficient and scalable processes to manufacture genetically modified T cells of high quality, which are currently being used to produce rivo-cel and BPX-601 for our clinical trials. We are leveraging this know how in combination with our proprietary cellular control technologies, resources, capabilities and expertise for the manufacture of CAR-T product candidates to create and develop first and best-in-class product candidates.

We have established in-house cell manufacturing and vector production capabilities at our headquarters facility in Houston, Texas. We completed the facility build-out in early 2018, and we expect that our facilities will meet our U.S. clinical trial and early commercialization requirements. For the European market, we plan to continue working with established contract manufacturers.

Pipeline

The following table summarizes our product candidate pipeline:

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Cellular Immunotherapy

Cellular immunotherapy harnesses immune cells to attack and eliminate harmful diseased cells in the body. The immune system is the body's defense network. It consists of a number of cells (leukocyte) and organs that, working together, recognize and respond to threats in the form of pathogens-modified or transformed cells. T cells are a type of white blood cell that recognize pathogens and can target and eliminate them upon full activation through the addition of appropriate co-stimulatory signals.

The following therapeutic applications of cellular immunotherapy have been primary areas of research and development by research institutes and biopharmaceutical companies, given their promise of effectively treating patients suffering from severe and life-threatening diseases.

Genetically Modified T-cell Therapy (CAR-T). This approach entails collecting a patient's or donor's T cells, genetically modifying them ex vivo, or outside of the body, to incorporate specific receptors which target cancer cells and then re-infusing the modified T cells into the patient. CARs are designed to target whole antigens on the surface of cancer cells. In early human clinical trials, CAR-T cell therapy has demonstrated an unprecedented ability to achieve durable complete responses in some leukemias and lymphomas, even in patients who have suffered multiple relapses.

HSCT. HSCT is the transplantation of stem cells and other immune cells derived from bone marrow, peripheral blood or umbilical cord blood. The transplantation may be autologous, using the patient's own cells, or allogeneic, using a donor's cells. HSCT is often the only curative option for a wide range of treatment-refractory hematological cancers, such as acute myeloid leukemia. HSCT is also used as a high-risk treatment for orphan inherited blood disorders, such as sickle-cell disease, beta-thalassemia and certain immune disorders.

Limitations of Current Cellular Immunotherapy Approaches.

Despite rapid advances in various approaches to cellular immunotherapy and the biopharmaceutical industry's considerable investment in research and development, certain challenges have prevented these therapies from realizing their maximum potential. Some of these obstacles and issues are highlighted below:

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Cellular Immunotherapy Approach	Safety Challenges	Efficacy Challenges
CAR T	Severe immune toxicity, e.g. Cytokine Release Syndrome (CRS)	Lack of efficacy in solid tumors
	Neurotoxicity	Limited long-term durability in hematological malignancies
	On-target/off-tumor autoimmune responses	Small number of validated tumor-specific antigens that can be targeted
	Requirement for hospitalization/intensive care management	
Allogeneic HSCT	GvHD from donor T cells	Limited HLA-matched donor availability, and time to securing donor
	Infections due to immunodeficiency and prolonged immune suppression	GvHD management (e.g. corticosteroids, T cell depletion) increase risk of non-engraftment, disease relapse, and infection

Our Proprietary CID Technology Platform

Our proprietary CID technology platform is designed to address the challenges of current cellular immunotherapies. Cellular activities and functions, such as growth, activation, proliferation and cell death, are controlled by signaling cascades following aggregation of specific proteins. Our CID platform consists of molecular switches, modified forms of these signaling proteins, which are triggered inside the patient by infusion of a small molecule, rimiducid or temsirolimus, instead of by natural upstream signals. Our current product candidates are based on either an “activation switch”, a “safety switch,” or a “dual switch” which contains both activation and safety switches. After rimiducid is administered, the “safety switch” is designed to lead to apoptosis, and the “activation switch” is designed to lead to proliferation, activation and enhanced persistence of immune cells. In “dual switch” product candidates, a modified form of the safety switch is triggered by the infusion of temsirolimus.

We incorporate the molecular switches in the appropriate immune cells and administer them to the patient. After the modified immune cells are inside the patient’s body, specific functions of these cells may be controlled by administration of small molecule ligands (rimiducid or temsirolimus) by intravenous infusion. The CID switch proteins have been designed to specifically bind to rimiducid or temsirolimus. Once introduced, these ligands couple, or aggregate, CID switch proteins together to create a cluster that triggers the signaling cascade. Aside from its impact on CID-modified immune cells bearing switch proteins, rimiducid is bioinert and has no other known effect on the body. In dual-switch applications, temsirolimus can be used to activate a safety switch, if severe, treatment-related toxicities occur.

Our proprietary CID-based product candidates depend on the following signaling molecules to trigger signaling cascades, resulting in different cell activities:

- CaspaCIDe: Signaling Molecule for Apoptosis. CaspaCIDe is also known as inducible Caspase-9. Caspase-9 is the initiating enzyme in the apoptosis pathway. When activated, the dimerization of iCasp9 leads to rapid apoptosis of gene-modified T cells.
- iMC: Signaling Molecules for Activation and Proliferation. iMC is also known as inducible MyD88 and CD40. Myeloid differentiation primary response gene, or MyD88, is a protein that has functions in cellular responses to stimuli such as stress, cytokines and bacteria or viruses. CD40 is a co-stimulatory protein found on antigen-presenting cells, such as dendritic cells and B cells and is required for their full activation. Activation of iMC in immune cells, such as T lymphocytes, provides inducible co-stimulation, leading to enhanced T cell survival and proliferation. In addition, activation of iMC causes T cells to secrete pro-inflammatory cytokines and chemokines, and to express co-stimulatory cell surface molecules to potentially modulate the tumor microenvironment and stimulate the patient’s own immune system.

Our Proprietary Switch Technologies

With the CID platform as the foundation, we have created different molecular switch technologies customized for specific cellular immunotherapy approaches and therapeutic indications.

CaspaCIDe

CaspaCIDe is our CID-based safety switch technology designed to eliminate cells in the event of toxicity. The CaspaCIDe switch consists of the CID-binding domain coupled to the signaling domain of Caspase-9, an enzyme that is an integral part of the apoptotic, cell death pathway. Infusion of rimiducid is designed to trigger dimerization and activation of this domain of Caspase-9, which in turn leads to selective apoptosis of the CaspaCIDe-expressing cells. Because CaspaCIDe is designed to be permanently incorporated into

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our cellular therapies, the safety switch has the potential to be available for use long after the initial therapy is delivered. Moreover, preclinical animal studies demonstrate the ability to modulate the elimination of cells containing CaspaCIDe by different rimiducid doses and schedules. This technology is applied to our rivo-cel product candidate.

We believe that CaspaCIDe is the optimal cell therapy safety switch technology described to-date. The only other widely reported clinically validated approach is based on the Herpes Simplex Virus thymidine kinase, or HSV-tk, a non-human immunogenic protein which can incorporate into a dividing cell's DNA, the widely-used anti-viral drug, ganciclovir, leading to cell death. Comparative nonclinical studies have demonstrated CaspaCIDe's potential benefits relative to HSV-tk, including lack of immunogenicity, effectiveness in rescuing animals from toxicities that have progressed, lack of dependence on the cell cycle for cell elimination, and most importantly, speed of elimination. In human trials, CaspaCIDe has demonstrated clinical activity beginning as soon as 30 minutes after administration of the activating drug, rimiducid. Lastly, rimiducid is bio-inert in the absence of cells containing a CID-based switch, and has no other clinical use. In contrast, ganciclovir is used to treat herpes virus family infections, and can have clinical side effects.

Other cell elimination approaches described in the literature include gene modification of cells to express truncated epidermal growth factor receptor (tEGFR) or codon-optimized CD20. Administration of the monoclonal antibodies, cetuximab or rituximab, respectively, is intended to trigger complement-dependent cytotoxicity, or CDC, or antibody-dependent cellular cytotoxicity, or ADCC, mediated cell elimination. While CaspaCIDe eliminates cells via the apoptotic pathway, the body's non-inflammatory mechanism for this important function, we believe a CDC-mediated mechanism may add to complications in patients already in an inflammatory crisis, such as seen with serious CRS after CAR-T cell therapy. Moreover, cetuximab and rituximab, both anti-cancer therapies that can have potentially serious side effects, are unlikely to be usable in a titratable manner. Lastly, these approaches have yet to demonstrate efficacy in clinical trials to control T cell-related toxicities.

CaspaCIDe has been evaluated in both preclinical and clinical studies, with additional clinical trials ongoing and planned.

GoCAR-T

Our GoCAR-T technology incorporates our proprietary iMC activation switch that activates CAR-T cells when triggered by both rimiducid and the targeted antigen expressed on the surface of the cancer cells. Current generation CAR-T cell constructs consist of a CD3- domain and one or more co-stimulatory molecules that are both activated when a cancer antigen binds to the portion of the CAR on the surface of the engineered T cell. This reliance on antigen for activation of the CAR-T cell results in an unpredictable and inherently uncontrollable therapeutic effect. For example, CAR-T cells that target the CD19 receptor have been shown to proliferate in excess of 100,000-fold in some patients, ultimately comprising over 50% of circulating lymphocytes. Solid tumor CAR-T cells, on the other hand, often fail to proliferate or persist at all for more than a few days or weeks and have been largely ineffective. In each situation, the physician has no effective way to intervene to achieve greater consistency once the cells have been administered.

Our GoCAR-T technology is designed to change the current paradigm by placing our proprietary co-activation domain, MC, under rimiducid control. GoCAR-T cells are designed to only be fully activated when exposed to both the cancer cells and rimiducid. This separation is designed to control the degree of activation of the CAR-T cells through adjustments to the schedule of rimiducid administration, but still in a tumor-dependent manner. This technology is applied to our BPX-601 product candidate.

In a proof-of-principle in vitro study of our GoCAR-T technology, GoCAR-T cells targeting the PSCA antigen were found to be only fully activated when the GoCAR-T cells were exposed to both their target PSCA-expressing human pancreatic cancer cells and rimiducid. In further in vivo studies of GoCAR-T technology, target antigen PSCA-expressing HPAC human pancreatic tumors, which were established in immune-deficient mice, were eliminated by administration of GoCAR-T cells targeting PSCA along with weekly rimiducid administration.

We believe these studies together provide proof-of-principle that GoCAR-T technology may allow rimiducid to modulate the therapeutic effect from initiation of treatment, turning CAR-T cell therapy from an uncontrollable, and largely unpredictable class into a more predictable therapy which can be adjusted, to the patient's therapeutic window.

Dual Switch GoCAR-T

Our dual switch GoCAR-T technology incorporates both our iMC and iC9 switches. The iMC switch is activated by the administration of rimiducid and the iC9 switch has been reengineered to be activated by the administration of temsirolimus and resistant to rimiducid. This technology is applied to our BPX-603 and BPX-802 product candidates.

Our Product Candidates

Rivo-cel: Allogeneic Polyclonal T Cells Intended to Improve HSCT Outcomes in the Treatment of Leukemias, Lymphomas and Inherited Blood Disorders

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Rivo-cel is a T cell therapy incorporating our CaspaCIDe safety switch intended to improve HSCT outcomes in the treatment of hematological malignancies and inherited blood disorders. Rivo-cel is designed to treat immunodeficiency following allogeneic HSCT, preventing morbidity and mortality due to disease relapse and infection. Rimiducid, when used in combination with rivo-cel, is designed to reduce morbidity and mortality due to GVHD caused by rivo-cel by activating CaspaCIDe and eliminating alloreactive rivo-cel cells.

The goal of our rivo-cel clinical program is to provide better overall transplant outcomes, faster immune recovery, lower rates of infection and lower rates of disease relapse than one would generally expect from an alternative allogeneic transplant procedure. We are currently conducting multiple clinical trials of rivo-cel. In November 2014, we initiated BP-004, a Phase 1/2 clinical trial in children with leukemias, lymphomas, or orphan inherited blood disorders, such as severe combined immunodeficiency, Wiskott-Aldrich Syndrome and beta thalassemia, all fatal or chronic life-long disorders for which HSCT is curative. The trial is being conducted in both European and U.S. pediatric transplant centers. The clinical trial is evaluating whether rivo-cel T cells from a haploidentical donor, typically the child's mother or father, administered following an alpha-beta TCR T-depleted and B-cell depleted HSCT, are safe and can enhance immune reconstitution. We have reported initial outcomes from these ongoing clinical trials at several medical meetings.

Based on interactions with the European Medicines Agency, or the EMA, we believe that data from the European arm of our BP-004 trial could form the basis of Marketing Authorisation Applications, or MAAs, for rivo-cel and rimiducid for pediatric patients with high-risk hematological cancers or certain orphan inherited blood disorders. In addition, the EMA's Committee for Medicinal Products for Human Use, or the CHMP, has agreed that review and approval under "exceptional circumstances" may be suitable, recognizing that a randomized trial may not be feasible in the pediatric haploidentical hematopoietic stem cell transplant setting. In place of a randomized trial, we are collecting data from the C/CP-004 study, a concurrent observational study in pediatric patients receiving a matched unrelated donor hematopoietic stem cell transplant. In addition, based on recent EMA feedback we are also planning on comparing our BP-004 results to similar patients registered in the European Bone Marrow Transplant (EBMT) registry. We expect to report updated top-line results from the BP-004 clinical trial in the second quarter of 2019 and to file MAAs for European marketing approvals in 2019.

We are currently conducting a pivotal randomized global Phase 2/3 clinical trial, called THRIVE, for rivo-cel in adult and adolescent patients 12 years and older with intermediate and high-risk acute myeloid leukemia (AML) or myelodysplastic syndromes (MDS). The trial will compare the primary endpoint of overall survival in patients receiving a haplo-transplant with rivo-cel versus the standard post-transplant cyclophosphamide haplo-transplant regimen. We submitted and reviewed the protocol with the FDA during a Type C meeting and initiated patient screening in the trial in December of 2018.

BPX-601: GoCAR-T Product Candidate for Solid Tumors

We are developing BPX-601, an autologous GoCAR-T product candidate containing our proprietary iMC activation switch, designed to treat solid tumors expressing prostate stem cell antigen, or PSCA. PSCA is a cancer antigen expressed in several solid tumor indications, including pancreatic, gastric and prostate cancers. Pre-clinical data shows iMC enhances T cell proliferation and persistence, enhances host immune activity, and modulates the tumor microenvironment to improve the potential to treat solid tumors compared to traditional CAR-T therapies. A Phase 1/2 clinical trial, called BP-012, in patients with pancreatic, gastric, or prostate cancers expressing PSCA is ongoing and we expect to report updated data from this clinical trial in 2019

BPX-603: Dual Switch GoCAR-T Product Candidate for Solid Tumors

We are developing BPX-603, which is our first controllable dual-switch GoCAR-T product candidate and incorporates both the iMC activation switch and the Caspacide safety switch. BPX-603 is designed to target solid tumors that express the human epidermal growth factor receptor 2 antigen, or HER2. HER2 is a validated antigen for cancer therapies, and academic CAR-T cell clinical studies have shown evidence of antitumor activity. These academic CAR-T approaches targeting HER2 have been limited by modest clinical efficacy and off-tumor/on-target toxicity. Bellicum believes that its dual-switch GoCAR-T technology may be uniquely suited to improve upon these earlier efforts, by driving greater efficacy through iMC activation while enabling clinicians to manage any treatment-emergent toxicities with CaspaCIDe. Bellicum expects to submit an IND for BPX-603 and to initiate a

clinical trial in 2019.

BPX-802: Dual Switch GoCAR-T Product Candidate for Liquid Tumors

We are developing BPX-802, a dual switch Go-CAR-T product candidate that contains our proprietary iMC and CaspaCIDe switches, which is designed to target an antigen expressed in hematological malignancies. We expect to submit an IND for BPX-802 in late 2019.

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BPX-701: T cell receptor (TCR) Product Candidate for Liquid Tumors

BPX-701 is a TCR candidate that incorporates the CaspaCIDe safety switch and is designed to target malignant cells expressing the preferentially-expressed antigen in melanoma, or PRAME. A Phase 1 clinical trial, BP-011, is ongoing in refractory or relapsed acute myeloid leukemia (AML) and myelodysplastic syndromes (MDS).

Manufacturing, Processing and Delivering to Patients

We have developed efficient and scalable processes to manufacture genetically modified T cells of high quality. We historically have worked with third-party contract manufacturers in both Europe and the U.S. to produce rivo-cel and BPX-601 for our clinical trials. In the first quarter of 2017, we completed the initial phase of the build-out of our in-house cell manufacturing and vector production capabilities in 30,400 square feet of leased space at our headquarters in Houston, Texas. This site was designed and constructed to satisfy both U.S. and European regulatory requirements. We began manufacturing clinical trial material from this site beginning in the first quarter of 2017 and completed the build-out of this facility in early 2018 and expect that it will meet our U.S. clinical trial and early commercialization requirements. For the European market, we plan to continue working with established contract manufacturers. We are leveraging the processes we have developed for rivo-cel and BPX-601 in combination with our proprietary cellular control technologies, resources, capabilities and expertise for the manufacture of CAR-T product candidates to create and develop first and best-in-class product candidates.

Our product candidates require a combination of three critical components: (1) viral vectors with DNA content encoded for our proprietary switch proteins and co-stimulatory and other accessory molecules, (2) patient-specific donor T cells that are genetically modified by our viral vectors, and (3) the synthetic small molecule rimiducid, which activates the switch proteins. Each of these components requires a separate supply chain and shares the same regulatory requirements applicable for biological or chemical materials suitable for human use. Details on each of these components are described below:

- Viral Vectors. We use gamma retrovirus to transduce our T cell-based product candidates. We believe that gamma retrovirus is optimal for T cell transduction given that it is an integrating vector that induces long-term gene expression, exhibits high transduction efficiency, has sufficient capacity for DNA content, and has been safely used in clinical trials. We are now able to manufacture viral vector in our Houston manufacturing facility.
- Genetically Modified T Cells. We have designed and refined a proprietary process for cell engineering that has been improved from lab-based open procedures used in academic and research settings to a functionally closed system that is more appropriate for large-scale clinical trials and commercialization. Our systems are designed to be compliant with current guidelines and regulations for cell-based manufacturing in the U.S. and Europe and have been successfully implemented in our facility and transferred and implemented by our CMOs.
- Synthetic Small Molecule. Rimiducid is a synthetic small molecule which has been rationally designed to trigger the proprietary switch proteins in our CID platform. We have separate third-party manufacturers for the active pharmaceutical ingredient, or API, and the finished drug product. Manufacturers of both the API and finished drug product are licensed to manufacture a variety of marketed drugs worldwide and have been selected based on their ability to provide supplies for our clinical trials and future commercialization.

We are focused on continuously refining our overall cell therapy process, manufacturing, processing and delivery to patients to be more efficient. Our current process cycles for our product candidates, from collection of white blood cells to infusion of the final product, can be completed in as little as four weeks and are customized to be complementary to the treatment procedure of interest in order to prevent delays or complications.

Intellectual Property

We seek to protect proprietary technology, inventions, and improvements that are commercially important to our business by seeking, maintaining, and defending patent rights, whether developed internally or licensed from third parties. We also seek to rely on regulatory protection afforded through orphan drug designations, data exclusivity, market exclusivity and patent term extensions where available as well as contractual agreements with our academic and commercial partners.

To achieve this objective, a strategic focus for us has been to identify and license key patents and patent applications that serve to enhance our intellectual property and technology position. Our intellectual property estate includes: (1) claims directed to core CID technologies and components used in our products; (2) claims directed to methods of

treatment for therapeutic indications; (3) claims directed to specific products; and (4) claims directed to innovative methods for generating new constructs for genetically engineering T cells. We believe our patent estate, together with our efforts to develop and patent next generation technologies, provides us with a substantial intellectual property position. However, the area of patent and other intellectual property rights in biotechnology is an evolving one with many risks and uncertainties.

To our knowledge, our patent estate, on a worldwide basis, includes 180 issued patents, 22 of which are in the U.S., and 89 pending patent applications, 16 of which are in the U.S., which we own or for which we have an exclusive, either in its entirety or within our

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field of use, commercial license as of February 28, 2019. The provisional and pending patent applications and issued patents include composition of matter and method of use claims.

We have internally developed technology disclosed in four pending utility patent applications in the U.S. and 24 pending foreign patent applications, and one pending PCT application which relate to our GoCAR-T technology. If U.S. patents issue from the U.S. applications, the estimated expiration date of the last to expire patent is in 2036. If patents are issued in foreign jurisdictions, the anticipated expiration dates will be in 2036.

Pursuant to our licenses from Baylor and Ariad, we have exclusive commercial rights to ten issued U.S. patents expiring in 2024 or later, 13 pending U.S. utility patent applications, nine issued foreign patents expiring in 2024 or later and 14 pending patent applications in foreign jurisdictions that relate to our GoCAR-T, rivo-cel and certain of our other technologies. If U.S. patents issue from the currently pending U.S. patent applications, the estimated expiration date of the last to expire patent is 2031. If patents from the currently pending patent applications are issued in foreign jurisdictions, the estimated expiration dates range from 2024 to 2029.

Pursuant to our license agreement with Agensys and Leiden we have exclusive commercial rights for technology to target certain cancer-specific antigens.

Composition of matter patent coverage on rimiducid has expired. However, we believe that additional barriers to entry exist for a competitor attempting to use rimiducid. This is significant because, if true, then potential competitors will not be able to use the abbreviated new drug application pathway for approval of rimiducid. With respect to our investigational products, the FDA has assigned combination product status to rivo-cel, and we plan to submit a Biologics License Application, or BLA, for the combination product. We believe that this will be the case for each future product candidate of ours that incorporates rimiducid. If our investigational products incorporating rimiducid receive FDA approval through BLAs, then the FDA would not approve any biosimilar of these combination products until at least 12 years from the date that we receive FDA approval. Additionally, although 'biosimilar' provisions exist for products approved through BLAs, it is not clear if the FDA will permit the biosimilar route to be used for complex biological products such as our investigational products.

In Europe, rivo-cel and rimiducid have both been designated orphan medicinal products and are intended for use in a pediatric population. As a result, under the EU Orphan Drug Regulation, each product is eligible for twelve years of market exclusivity, during which the EMA will not approve another application for a marketing authorization for the same indication with respect to a similar medicinal product.

Our strategy is also to develop and obtain additional intellectual property covering manufacturing processes and methods for genetically engineering T cells expressing new constructs. To support this effort, we have established expertise and development capabilities focused in the areas of preclinical research and development, manufacturing and manufacturing process scale-up, quality control, quality assurance, product delivery and storage, regulatory affairs and clinical trial design and implementation. As appropriate, we expect to file additional patent applications to expand this layer of our intellectual property estate.

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, the patent term is 20 years from the date of filing of the first non-provisional application to which priority is claimed. In the U.S., a patent's term may be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the U.S. Patent and Trademark Office, or the USPTO, in granting a patent, or may be shortened if a patent is terminally disclaimed over an earlier-filed patent. The term of a patent that covers an FDA-approved drug or biologic may also be eligible for a patent term restoration of up to five years under the Hatch-Waxman Act, which is designed to compensate for the patent term lost during the FDA regulatory review process. The length of the patent term restoration is calculated based on the length of time the drug or biologic is under regulatory review. A patent term restoration under the Hatch-Waxman Act cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval and only one patent applicable to an approved drug or biologic may be restored. Moreover, a patent can only be restored once, and thus, if a single patent is applicable to multiple products, it can only be extended based on one product. Similar provisions are available in Europe and certain other foreign jurisdictions to extend the term of a patent that covers an approved drug or biologic. When possible, depending upon the length of clinical trials and other factors involved in the filing of a BLA we expect to apply for patent term extensions for patents covering our product candidates and their methods of

use.

We may rely, in some circumstances, on trade secrets to protect our technology. We seek to protect our proprietary technology and processes, in part, by entering into confidentiality agreements with our employees, consultants, scientific advisors and contractors. We also seek to preserve the integrity and confidentiality of our data and trade secrets by maintaining physical security of our premises and physical and electronic security of our information technology systems. While we have confidence in these individuals, organizations and systems, agreements or security measures may be breached, and we may not have adequate remedies for any 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 know-how and inventions.

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Our Collaboration and License Agreements

Co-Development and Co-Commercialization Agreement - Adaptimmune

In December 2016, we and Adaptimmune Therapeutics plc, or Adaptimmune entered into a Co-Development and Co-Commercialization Agreement, or the Adaptimmune Agreement, in order to facilitate a staged collaboration to evaluate, develop and commercialize next generation T cell therapies.

Under the Adaptimmune Agreement, the parties agreed to evaluate our GoTCR technology, iMC co-stimulation, with Adaptimmune's affinity-optimized SPEAR® T cells for the potential to create enhanced TCR product candidates. Depending on results of the preclinical proof-of-concept phase, the parties expect to progress to a two-target co-development and co-commercialization phase. To the extent necessary, and in furtherance of the parties' proof-of-concept and co-development efforts, the parties granted each other a royalty-free, non-transferable, non-exclusive license covering their respective technologies for purposes of facilitating such proof-of-concept and co-development efforts. In addition, as to covered therapies developed under the Adaptimmune Agreement, the parties granted each other a reciprocal exclusive license for the commercialization of such therapies.

With respect to any joint commercialization of a covered therapy, the parties agreed to negotiate in good faith the commercially reasonable terms of a co-commercialization agreement. The parties also agreed that any such agreement shall provide for, among other things, equal sharing of the costs of any such joint commercialization and the calculation of profit shares as set forth in the Adaptimmune Agreement.

The Adaptimmune Agreement will expire on a country-by-country basis once the parties cease commercialization of the T cell therapies covered by the Adaptimmune Agreement, unless earlier terminated by either party for material breach, non-performance or cessation of development, bankruptcy/insolvency, or failure to progress to co-development phase.

Collaboration Agreement - OPBG

In October 2016, we entered into a collaboration agreement with Ospedale Pediatrico Bambino Gesù, ("OPBG"), or the OPBG Agreement, pursuant to which we and OPBG agreed to collaborate on research projects and early stage clinical trials for the design and development of various T cell immunotherapies, or the OPBG Research.

As consideration for OPBG's performance of the OPBG Research and grant of certain licenses to us, we agreed to fund an aggregate of up to $4.4 million in project costs payable to OPBG or certain third-party service providers, as applicable, over the term of the OPBG Research, estimated to be four years. With respect to any inventions arising from the OPBG Research, OPBG agreed to grant us an exclusive license to any such inventions, the terms of which would be set forth in a separate agreement. In addition, OPBG granted us paid-up, worldwide co-exclusive licenses for non-commercial development of OPBG's CD19 and CAR.GD2 CAR T technologies, as well as paid-up, worldwide exclusive licenses to commercialize OPBG's CD19 and CAR.GD2 CAR T technologies, each to be governed by a separate agreement.

The term of the OPBG Agreement expired on December 31, 2018. To date, we have not entered into the contemplated separate agreements to continue development of the CD19 and GD2 targeted constructs.

Collaboration Agreement - Leiden

In May 2016, we and Academisch Ziekenhuis Leiden, also acting under the name Leiden University Medical Centre, or Leiden, entered into a research collaboration agreement, or the Leiden Agreement, pursuant to which we will provide Leiden with financial support for research to discover and validate high-affinity TCR product candidates targeting several cancer-associated antigens, or the Research.

As consideration for Leiden's performance of the Research, we agreed to pay Leiden an aggregate of EUR 2.5 million in quarterly installments during the three-year term of the Research. With respect to any inventions arising from the Research that are relevant to or useful for any high affinity TCR that is studied in the Research, Leiden granted us an exclusive option to obtain an exclusive, worldwide license to practice and exploit such inventions. The parties agreed to negotiate in good faith the commercially reasonable terms of each such license agreement entered into between the parties, based on terms similar to those set forth in the previously executed license agreement between the parties and those specified in the Leiden Agreement.

The Research will be conducted during a three-year term, after which the Leiden Agreement will expire. We and Leiden have agreed to negotiate in good faith a potential extension of such term, dependent on Leiden's progress in the performance of the Research. Either party may terminate the Leiden Agreement upon a material breach by the other party that remains uncured following 30 days after the date of written notice of such breach. Leiden may terminate the Leiden Agreement in the event of a failure by us to pay any amounts due under the Leiden Agreement that remains uncured on the date that is 30 days after written notice of such failure.

License Agreement - Agensys

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In December 2015, we and Agensys entered into a license agreement, or the Agensys Agreement, pursuant to which (i) Agensys granted us, within the field of cell and gene therapy of diseases in humans, an exclusive, worldwide license and sublicense to its patent rights directed to PSCA and related antibodies, and (ii) we granted Agensys a non-exclusive, fully paid license to our patents directed to inventions that were made by us in the course of developing our licensed products, solely for use with Agensys therapeutic products containing a soluble antibody that binds to PSCA or, to the extent not based upon our other proprietary technology, to non-therapeutic applications of antibodies not used within the field.

As consideration for the rights granted to us under the Agensys Agreement, we agreed to pay to Agensys a non-refundable upfront fee of $3.0 million. We are also required to make aggregate milestone payments to Agensys of up to (i) $5.0 million upon the first achievement of certain specified clinical milestones for its licensed products, (ii) $50.0 million upon the achievement of certain specified clinical milestones for each licensed product, and (iii) $75.0 million upon the achievement of certain sales milestones for each licensed product. The Agensys Agreement additionally provides that we will pay to Agensys a royalty percentage that ranges from the mid to high single digits based on the level of annual net sales of licensed products by us, our affiliates or permitted sublicensees. The royalty payments are subject to reduction under specified circumstances.

Under the Agensys Agreement, Agensys also was granted the option to obtain an exclusive license, on a product-by-product basis, from us to commercialize in Japan each licensed product developed under the Agensys Agreement that has completed a phase 2 clinical trial. As to each such licensed product, if Agensys or its affiliate, Astellas Pharma, Inc., exercises the option, the Agensys Agreement provides that we will be paid an option exercise fee of $5.0 million. In addition, the Agensys Agreement provides that we will be paid a royalty that ranges from the mid to high single digits based on the level of annual net sales in Japan of each such licensed product. If the option is exercised, the aggregate milestone payments payable by us to Agensys, described above with respect to each licensed product, would be reduced by up to an aggregate of $65.0 million upon the achievement of certain specified clinical and sales milestones.

The Agensys Agreement will terminate upon the expiration of the last royalty term for the products covered by the Agensys Agreement, which is the earlier of (i) the date of expiration or abandonment of the last valid claim within the licensed patent rights covering any licensed products under the Agensys Agreement, (ii) the expiration of regulatory exclusivity as to a licensed product, and (iii) 10 years after the first commercial sale of a licensed product. Either party may terminate the Agensys Agreement upon a material breach by the other party that remains uncured following 60 days after the date of written notice of such breach (or 30 days if such material breach is related to failure to make payment of amounts due under the Agensys Agreement) or upon certain insolvency events. In addition, Agensys may terminate the Agensys Agreement immediately upon written notice to us if we or any of our affiliates or permitted sublicensees commence an interference proceeding or challenge the validity or enforceability of any of Agensys' patent rights.

License Agreement - BioVec

In June 2015, we and BioVec Pharma, Inc., or BioVec, entered into a license agreement, or the BioVec Agreement, pursuant to which BioVec agreed to supply us with certain proprietary cell lines and granted us a non-exclusive, worldwide license to certain of its patent rights and related know-how related to such proprietary cell lines.

As consideration for the products supplied and rights granted to us under the BioVec Agreement, we agreed to pay to BioVec an upfront fee of $100,000 within ten business days of the effective date of the BioVec Agreement and a fee of $300,000 within ten business days of its receipt of the first release of GMP lot of the products licensed under the BioVec Agreement. In addition, we agreed to pay to BioVec an annual fee of $150,000, commencing 30 days following the first filing of an IND, or its foreign equivalent, for a product covered by the license; with such annual fees being creditable against any royalties payable by us to BioVec under the BioVec Agreement. We also are required to make a $250,000 milestone payment to BioVec for each of the first three licensed products to enter into a clinical phase trial and one-time milestone payments of $2.0 million upon receipt of a registration granted by the FDA or EMA on each of our first three licensed products. The BioVec Agreement additionally provides that we will pay to BioVec a royalty in the low single digits on net sales of products covered by the BioVec Agreement. We may also grant sublicenses under the licensed patent rights and know-how to third parties for limited purposes related to the use,

sale and other exploitation of the products licensed under the BioVec Agreement. The BioVec Agreement will continue until terminated. The BioVec Agreement may be terminated by us, in our sole discretion, at any time upon 90 days written notice to BioVec. Either party may terminate the BioVec Agreement in the event of a breach by the other party of any material provision of the BioVec Agreement that remains uncured on the date that is 60 days after written notice of such failure or upon certain insolvency events that remain uncured following the date that is 30 days after the date of written notice to a party regarding such insolvency event.

License Agreement - Leiden

In April 2015, we and Leiden, entered into a license agreement, or the 2015 Leiden Agreement, pursuant to which Leiden granted to us an exclusive, worldwide license to its patent rights covering high affinity T-cell receptors targeting PRAME, and POU2AF1 epitopes. The license granted under the 2015 Leiden Agreement is subject to certain restrictions and to Leiden’s retained right to use the

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licensed patents solely for academic research and teaching purposes, including research collaborations by Leiden with academic, non-profit research third parties; provided that Leiden provides 30 days advance written notice to us of such academic research collaborations.

As consideration for the rights granted to us under the 2015 Leiden Agreement, we agreed to pay to Leiden an aggregate of EUR 75,000 in upfront fees within 30 days of the effective date of the 2015 Leiden Agreement. In addition, we agreed to pay to Leiden, beginning on the eighth anniversary of the effective date of the 2015 Leiden Agreement, annual minimum royalty payments of EUR 30,000. We are also required to make milestone payments to Leiden of up to an aggregate of EUR 1,025,000 for each of the first licensed product that is specific to PRAME and to POU2AF1. The 2015 Leiden Agreement additionally provides that we will pay to Leiden a royalty in the low single digits on net sales of products covered by the 2015 Leiden Agreement. If we enter into a sublicensing agreement with a third party related to a product covered by the Leiden Agreement, we have agreed to pay Leiden a percentage ranging in the low double digits on all non-royalty income received from sublicensing revenue directly attributable to the sublicense, dependent on whether we are in phase 1/2, phase 2 or phase 3 at the time that we enter into any such sublicensing agreement.

Under the 2015 Leiden Agreement, we and Leiden entered into a sponsored research agreement, pursuant to which we are required to pay Leiden up to EUR 300,000 over a three-year period during the term of the sponsored research agreement. The 2015 Leiden Agreement will expire upon the expiration of the last patent included in the licensed patent rights. The 2015 Leiden Agreement may be terminated earlier upon mutual written agreement between us and Leiden, and at any time by us upon six months written notice to Leiden. Leiden may terminate the 2015 Leiden Agreement in the event of a failure by us to pay any amounts due under the 2015 Leiden Agreement that remains uncured on the date that is 30 days after written notice of such failure. Either party may terminate the 2015 Leiden Agreement upon a material breach by the other party that remains uncured following 30 days after the date of written notice of such breach or upon certain insolvency events that remain uncured following the date that is 45 days after the date of written notice to a party of such insolvency event.

License Agreement - ARIAD Pharmaceuticals, Inc.

2011 License Agreement

In March 2011, we entered into an amended and restated exclusive license agreement, or restated ARIAD license, with ARIAD which restated a license agreement entered into in 2006. Under the restated ARIAD license, ARIAD granted to us an exclusive, even as to ARIAD, license, with the right to grant sublicenses, under ARIAD's patent rights relating to dimerizers, genetic constructs coding for dimerizer binding domains, vectors containing said constructs, cells containing said constructs and methods of inducing biological processes in cells containing said constructs. These licensed patent rights were limited in the 2011 restated license to defined products in the fields of cell transplantation and certain types of cancer.

In connection with the original license from ARIAD, in 2006 we issued 121,242 shares of our common stock to ARIAD which were subject to antidilution protection that ultimately resulted in additional issuances to ARIAD by us of 556,221 shares of our common stock, such that ARIAD received a total of 677,463 shares of our common stock under the original license agreement. In addition, we paid ARIAD a license fee of $250,000 in connection with the restated license in 2011. The restated ARIAD license also provided for certain royalty and milestone payments, which were subsequently terminated pursuant to an omnibus amendment agreement with ARIAD.

Under the restated ARIAD license, we are required to diligently proceed with the development, manufacture and sale of licensed products. The restated ARIAD license is subject at all times to restrictions and obligations under a license agreement by and between ARIAD Gene Therapeutics, Inc., an ARIAD affiliate that merged into ARIAD, and the academic institution from with ARIAD obtained its license to the underlying technology. While we are not required to pay royalties or fees to such academic institution, no sublicensee of ours may enter into a sublicense with respect to any intellectual property owned by the academic institution without its consent, which terms must be consistent with those included in the agreement between ARIAD and such academic institution.

The restated ARIAD license will expire upon expiration of the last license term of a licensed product covered by the agreement, which is the later of (1) 12 years from the date of the first commercial sale of the licensed product, or

(2) the expiration of the last to expire valid patent claim on the licensed product. Either party to the license may terminate or modify the restated ARIAD license upon a material breach by the other party that remains uncured following the date that is 30 days after written notice of a payment breach and 90 days for any other breach, and effective immediately upon bankruptcy of the other party. We may terminate the restated ARIAD license in our sole discretion at any time if we determine not to develop or commercialize any licensed product. In addition, upon termination of the restated ARIAD license prior to expiration, we must transfer any ownership and any beneficial ownership in any orphan drug designation or any similar designation in any jurisdiction of orphan drug status of the ARIAD dimerizer to ARIAD.

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2014 Amendment

In October 2014, we entered into an omnibus amendment agreement with ARIAD, which in part amended the restated ARIAD license to expand the license to cover a broader scope of dimerizers and licensed products for use and exploitation in any human therapeutic field of use other than in vivo administration of genetic material directly into a human being using viral vectors for the purpose of producing proteins or other macromolecules that are expressed or secreted for therapeutic or prophylactic purposes.

In connection with the amendment, we made an initial payment of $15.0 million and we issued a promissory note to ARIAD for a principal amount of $35.0 million in return for the broader scope of the license and the termination of all obligations to make milestone and royalty payments to ARIAD in the future. On December 23, 2014, the closing of our initial public offering triggered an acceleration of the payment of $15.0 million due to ARIAD under the amendment and the promissory note. As a result of such acceleration, on December 29, 2014, we paid to ARIAD an aggregate amount of $35.0 million, which included an additional payment of $20.0 million to extinguish the promissory note. In exchange, ARIAD returned to us all of the 677,463 shares of our common stock then held by ARIAD and all of the agreements related to ARIAD's rights as a stockholder were terminated.

License Agreements - Baylor College of Medicine

2008 Baylor License Agreement

Pursuant to an Exclusive License Agreement with Baylor College of Medicine, or Baylor, dated March 20, 2008, or the 2008 Baylor license agreement, we obtained an exclusive, worldwide and fully paid up license to certain intellectual property, including intellectual property related to methods for activating antigen presenting cells and to genetic constructs coding for membrane bound inducible cytoplasmic CD40.

As consideration for the 2008 Baylor license agreement, we issued to Baylor 23,529 shares of our common stock and assumed responsibility for all legal fees and expenses, filing or maintenance fees, assessments and all other costs and expenses related to prosecuting, obtaining and maintaining patent protection on the patents subject to the 2008 Baylor license agreement.

The 2008 Baylor license agreement is subject to certain restrictions and is nonexclusive with respect to (1) the making or use of the licensed intellectual property for use in non-commercial research, patient care, teaching, and other educational purposes; (2) any non-exclusive license covering the licensed intellectual property that Baylor grants to other academic or research institutions for noncommercial research purposes; (3) any non-exclusive licenses that Baylor is required to grant to the U.S. or foreign state pursuant to an existing or future treaty with the U.S.; and (4) a non-exclusive license granted to ARIAD under the terms of a materials transfer agreement between Baylor and ARIAD.

Baylor may terminate or modify the 2008 Baylor license agreement in the event of a material breach by us that remains uncured following the date that is 90 days after written notice of such breach or upon certain insolvency events that remain uncured following the date that is 30 days following written notice of such insolvency event. We may terminate the 2008 Baylor license agreement, or any portion thereof, at our sole discretion at any time upon 30 days' written notice to Baylor. Upon termination of the 2008 Baylor license agreement, all rights to the intellectual property immediately revert to Baylor.

2010 Baylor License Agreement

Pursuant to an Exclusive License Agreement with Baylor, dated June 27, 2010, or the 2010 Baylor license agreement, we obtained an exclusive, worldwide license to certain intellectual property, including intellectual property related to methods for treating prostate cancer, methods of administering T cells to a patient, and methods of activating antigen presenting cells with constructs comprising MyD88 and CD40.

Pursuant to the terms of the 2010 Baylor license agreement, we paid Baylor a license execution fee of $30,000. In addition, we are required to pay a low annual maintenance fee on each anniversary of the agreement date.

The terms of the 2010 Baylor license agreement also require us to make royalty payments of less than one percent, subject to certain annual minimums, on net sales of products covered by the license. In addition, to the extent we enter into a sublicensing agreement relating to a licensed product, we are required to pay Baylor a percentage in the mid-single digits on all non-royalty income received from sublicensing revenue. Bellicum is required to make milestone payments, of up to $735,000 in aggregate, upon successful completion of clinical and regulatory milestones

regarding the first two products covered by this license.

The 2010 Baylor license agreement will expire upon expiration of the last patent contained in the licensed patent rights, on a country-by-country basis, upon which we will have a perpetual, paid-in-full license in such country. Baylor may terminate or modify the 2010 Baylor license agreement in the event of a material breach by us that remains uncured following the date that is 90 days after written notice of such breach or upon certain insolvency events that remain uncured following the date that is 30 days following written notice of such insolvency event. We may terminate the 2010 Baylor license agreement, or any portion thereof, at our sole discretion at any

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time upon 60 days' written notice to Baylor. Upon termination of the 2010 Baylor license agreement for any reason prior to expiration, we must assign to Baylor each authorized sublicense agreement that is currently in effect on the date of termination.

2014 Baylor License Agreement

Pursuant to an Exclusive License Agreement with Baylor, effective November 1, 2014, or the 2014 Baylor license agreement, we obtained an exclusive, worldwide license to certain intellectual property, including intellectual property related to methods for inducing selective apoptosis.

Pursuant to the terms of the 2014 Baylor license agreement, we paid Baylor a license execution fee of $25,000. In addition, we are required to pay Baylor a low annual maintenance fee on each anniversary of the agreement date. The terms of the 2014 Baylor license agreement also require us to make royalty payments in the low single digits, subject to certain annual minimums, on net sales of products covered by the license. To the extent we enter into a sublicensing agreement relating to a licensed product, Bellicum is also required to pay Baylor a percentage in the low double-digits on all non-royalty income received from sublicensing revenue. We are required to make milestone payments, of up to $275,000 in aggregate, upon successful completion of clinical and regulatory milestones regarding the first product covered by this license. The 2014 Baylor license agreement will expire upon expiration of the last patent contained in the licensed patent rights, on a country-by-country basis, upon which we will have a perpetual, paid-in-full license in each such country.

Baylor may terminate or modify the 2014 Baylor license agreement in the event of a material breach by us that remains uncured following the date that is 90 days after written notice of such breach or upon certain insolvency events that remain uncured following the date that is 30 days following written notice of such insolvency event. We may terminate the 2014 Baylor license agreement, or any portion thereof, at our sole discretion at any time upon 60 days' written notice to Baylor.

2016 Baylor License Agreements

In March 2016, we and Baylor entered into two additional license agreements pursuant to which we obtained exclusive rights to technologies and patent rights owned by Baylor. We paid Baylor a non-refundable license fee of $100,000, and could incur additional payments upon the achievement of certain milestone events as set forth in the agreements. If we are successful in developing any of the licensed technologies under either agreement, resulting sales would be subject to a royalty payment in the low single digits.

Grant Agreements

Grant Agreements with Cancer Prevention and Research Institute of Texas

In July 2011, we entered into a Cancer Research Grant Contract, or the First Grant Contract, with the Cancer Prevention and Research Institute of Texas, or CPRIT, under which CPRIT awarded a grant not to exceed approximately $5.7 million to be used for the execution of defined clinical development of rivo-cel. To date, we have received approximately $4.9 million under the grant. The Grant Contract terminated on June 30, 2014, but obligations exist as to licensing, royalty payments, and indemnification provisions.

In November 2016, we announced that the Company received notice of a product development award totaling approximately $16.9 million from CPRIT, the terms of which have been formalized in a contract. The CPRIT award is expected to fund a portion of a three-year global clinical program comprising clinical trials for adult and pediatric patients with high-risk and intermediate-risk AML, and potentially other hematologic cancers. The proposed studies are designed to evaluate the benefit of rivo-cel and rimiducid in the context of in vivo and ex vivo T cell depleted haploidentical HSCT. The CPRIT oversight committee met in February 2017 and agreed to move forward with the proposed terms of the grant agreement, and a second grant, or the Second Grant Contract was entered into in August 2017. Additionally, the First Grant Contract was amended in order to align revenue sharing terms, discussed below, with the Second Grant Contract. We are currently conducting a pivotal randomized Phase 2/3 clinical trial (THRIVE) supported in part by the CPRIT funding

Pursuant to the terms of each of the Grant Contracts, we grant to CPRIT a non-exclusive, irrevocable, royalty-free, perpetual, worldwide license to any technology and intellectual property resulting from the grant-funded activities and any other intellectual property that is owned by us and necessary for the exploitation of the technology and intellectual property resulting from the grant-funded activities, or the Project Results, for and on behalf of CPRIT and other

governmental entities and agencies of the State of Texas and private or independent institutions of higher education located in Texas for education, research and other non-commercial purposes only. The terms of each of the Grant Contracts require that we pay tiered royalties in the low- to mid-single digit percentages on revenues from sales and licenses of products or services that are based upon, utilize, are developed from or materially incorporate Project Results. Such royalties reduce to less than one percent after a mid-single-digit multiple of the grant funds have been repaid to CPRIT in royalties. Such royalties are payable for so long as we have marketing exclusivity or patents covering the applicable product or service (or twelve years from first commercial sale of such product or service in certain countries if there is no such exclusivity or patent protection).

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If we abandon patent applications or patents covering Project Results in certain major market countries, CPRIT can, at its own cost, take over the prosecution and maintenance of such patents and is granted a non-exclusive, irrevocable, royalty-free, perpetual license with right to sublicense in such country to the applicable Project Results. We are required to use diligent and commercially reasonable efforts to commercialize at least one commercial product or service or otherwise bring to practical application the Project Results. If CPRIT notifies us of our failure with respect to the foregoing, and such failure is not owing to material safety concerns, then, at CPRIT's option, the applicable Project Results would be transferred to CPRIT and CPRIT would be granted a non-exclusive license to any other intellectual property that is owned by us and necessary for the exploitation of the Project Results, and CPRIT, at its own cost, can commercialize products or services that are based upon, utilize, are developed from or materially incorporate Project Results. CPRIT's option is subject to our ability to cure any failures identified by CPRIT within 60 days and a requirement to negotiate in good faith with us with respect to an alternative commercialization strategy for a period of 180 days.

Competition

The biopharmaceutical industry is characterized by intense and dynamic competition to develop new technologies and proprietary therapies. Any product candidates that we successfully develop and commercialize will have to compete with existing therapies and new therapies that may become available in the future. While we believe that our proprietary CID platform, differentiated product candidates and scientific expertise in the field of cellular immunotherapy provide us with competitive advantages, we face potential competition from various sources, including larger and better-funded pharmaceutical, specialty pharmaceutical and biotechnology companies, as well as from academic institutions, governmental agencies and public and private research institutions.

Our rivo-cel product candidate is designed to improve HSCT outcomes by addressing risks of disease relapse, infections and GVHD control. The current standard-of-care that addresses some of the safety challenges associated with HSCT, primarily GvHD, is high-dose steroids. We are aware of other companies that are developing product candidates to improve the outcome of HSCT, including Kiadis Pharma Netherlands B.V., MolMed S.p.A., and Gamida Cell Ltd.

T-cell based treatments for cancer, such as CAR T and TCR therapies, have recently been an area of significant research and development by academic institutions and biopharmaceutical companies. BPX-601 may compete with product candidates from a number of companies that are currently focused on this therapeutic modality, including Adaptimmune, Allogene Therapeutics, Inc., Atara Biotherapeutics, Inc., Autolus Therapeutics plc, bluebird bio, Inc., Celgene Corporation, Cellectis SA, Cell Medica Limited, GlaxoSmithKline plc, Intrexon Corporation, Immune Design Corp., Gilead Sciences, Inc., Iovance Biotherapeutics, Inc., Kiadis Pharma B.V., Medigene AG, MolMed S.p.A., Mustang Bio, Inc., Novartis AG, Poseida Therapeutics, Precision Biosciences, Inc. ., Unum Therapeutics, and Ziopharm Oncology.

Many of our competitors, either alone or with their strategic partners, have substantially greater financial, technical and human resources than we do and significantly greater experience in the discovery and development of product candidates, obtaining FDA and other regulatory approvals of treatments and commercializing those treatments. Accordingly, our competitors may be more successful than us in obtaining approval for treatments and achieving widespread market acceptance. Our competitors' treatments may be more effective, or more effectively marketed and sold, than any treatment we may commercialize and may render our treatments obsolete or non-competitive before we can recover the expenses of developing and commercializing any of our treatments.

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

We anticipate that we will face intense and increasing competition as new drugs enter the market and advanced technologies become available. We expect any treatments that we develop and commercialize to compete on the basis of, among other things, efficacy, safety, convenience of administration and delivery, price, the level of generic

competition and the availability of reimbursement from government and other third-party payers. For example, if a third party is able to obtain a stand-alone new drug application for rimiducid, then potential generic manufacturers may be able to file abbreviated new drug applications for that product.

Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than any products that we may develop. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market. In addition, we expect that our therapeutic products, if approved, will be priced at a significant premium over competitive generic products and our ability to compete may be affected in many cases by insurers or other third-party payers seeking to encourage the use of generic products.

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Government Regulation and Product Approval

As a biopharmaceutical company that operates in the U.S., we are subject to extensive regulation. Our cell products will be regulated as biologics. With this classification, commercial production of our products will need to occur in registered and licensed facilities in compliance with the current good manufacturing practice, or cGMP, for biologics. The FDA regulates human cells, tissues, and cellular and tissue-based products, or HCT/Ps, under a two-tiered framework, based on risk categorization. Higher-risk HCT/Ps are regulated as biologics. Manufacturers of biologics are subject to extensive government regulation. For example, such products must complete extensive clinical trials, which must be conducted pursuant to an effective IND. The FDA must review and approve a BLA before a new biologic may be marketed.

The FDA considers our investigational products to be "combination products" because our products involve a biologic, the engineered cells, that is intended to be used with a small molecule chemical drug, rimiducid. In general, biologics such as our engineered cells are regulated through the FDA's Center for Biologics Evaluation and Research, or CBER, while synthetic drugs are regulated through the FDA's Center for Drug Evaluation and Research. When the FDA encounters a combination product such as our products, the agency determines which of the two centers will have primary responsibility for regulating the product by determining the primary mode of action for the product. The cellular component of our combination contributes the primary mode of action and, as a result, the FDA will regulate our investigational products as biologics, through CBER.

Government authorities in the U.S., at the federal, state and local levels, and in other countries extensively regulate, among other things, the research, development, testing, manufacturing, quality control, approval, labeling, packaging, storage, record-keeping, promotion, advertising, distribution, post-approval monitoring and reporting, marketing and export and import of biopharmaceutical products such as those we are developing. Our product candidates must be approved by the FDA before they may be legally marketed in the U.S. and by the appropriate foreign regulatory agency before they may be legally marketed in foreign countries. Generally, our activities in other countries will be subject to regulation that is similar in nature and scope as that imposed in the U.S., although there can be important differences. Additionally, some significant aspects of regulation in Europe are addressed in a centralized way, but country-specific regulation remains essential in many respects. The process for obtaining regulatory marketing approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources.

U.S. Product Development Process

In the U.S., the FDA regulates new drugs and biological products under the Federal Food, Drug and Cosmetic Act, or FDCA, the Public Health Service Act, or PHSA, and implementing regulations. Products are also subject to other federal, state and local statutes and regulations. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources. Failure to comply with the applicable U.S. requirements at any time during the product development process, approval process or after approval, may subject an applicant to administrative, criminal, or civil sanctions. The FDA sanctions could include, among other actions, refusal to approve pending applications, withdrawal of an approval, a clinical hold, warning letters, product recalls or withdrawals from the market, product seizures, total or partial suspension of production or distribution injunctions, fines, refusals of government contracts, restitution, disgorgement or civil or criminal penalties. Any administrative, criminal, or civil enforcement action could have a material adverse effect on us. The FDA has limited experience with commercial development of T cell therapies for cancer. The process required by the FDA before a biological product may be marketed in the U.S. generally involves the following:

- completion of nonclinical laboratory tests and animal studies according to good laboratory practices, or GLPs, and applicable requirements for the humane use of laboratory animals or other applicable regulations;
- submission to the FDA of an IND, which must become effective before human clinical trials may begin;
- performance of adequate and well-controlled human clinical trials according to the FDA's regulations commonly referred to as good clinical practices, or GCPs, and any additional requirements for the protection of human research patients and their health information, to establish the safety and efficacy of the proposed biological product for its

intended use;

- submission to the FDA of a BLA for marketing approval that includes substantial evidence of safety, purity, and potency from results of nonclinical testing and clinical trials;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities where the biological product is produced to assess compliance with cGMP, to assure that the facilities, methods and controls are adequate to preserve the biological product's identity, strength, quality and purity and, if applicable, the FDA's current good tissue practices, or GTPs, for the use of HCT/Ps;
- potential FDA audit of the nonclinical study and clinical trial sites that generated the data in support of the BLA; and
- FDA review and approval, or licensure, of the BLA.

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Before testing any biological product candidate, including our product candidates, in humans, the product candidate enters the preclinical testing stage. Preclinical tests, also referred to as nonclinical studies, include laboratory evaluations of product chemistry, toxicity and formulation, as well as animal studies to assess the potential safety and activity of the product candidate. The conduct of the preclinical tests must comply with federal regulations and requirements including GLPs. The clinical trial sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and a proposed clinical protocol, to the FDA as part of the IND. Some preclinical testing may continue even after the IND is submitted. The IND automatically becomes effective 30 days after receipt by the FDA unless the FDA raises concerns or questions regarding the proposed clinical trials and places the trial on a clinical hold within that 30-day time period. In such a case, the IND sponsor must resolve FDA's outstanding concerns before the clinical trial can begin. The FDA may also impose clinical holds on a biological product candidate at any time before or during clinical trials due to safety concerns or non-compliance. If the FDA imposes a clinical hold, trials may not recommence without FDA authorization and then only under terms authorized by the FDA. Accordingly, we cannot be sure that submission of an IND will result in the FDA allowing clinical trials to begin, or that, once begun, issues will not arise that suspend or terminate such clinical trials.

Clinical trials involve the administration of the biological product candidate to healthy volunteers or patients under the supervision of qualified investigators, generally physicians not employed by or under the trial sponsor's control. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical trial, dosing procedures, subject selection and exclusion criteria, and the parameters to be used to monitor subject safety, including stopping rules that assure a clinical trial will be stopped if certain adverse events should occur. Each protocol and any amendments to the protocol must be submitted to the FDA as part of the IND. Clinical trials must be conducted and monitored in accordance with the FDA's regulations comprising the GCP requirements, including the requirement that all research patients provide informed consent. Further, each clinical trial must be reviewed and approved by an institutional review board, or IRB, at or servicing each institution at which the clinical trial will be conducted. An IRB is independent from the trial sponsor and is charged with protecting the welfare and rights of clinical trial participants and considers such items as whether the risks to individuals participating in the clinical trials are minimized and are reasonable in relation to anticipated benefits. The IRB also approves the form and content of the informed consent that must be signed by each clinical trial subject or his or her legal representative and must monitor the clinical trial until completed. Clinical trials also must be reviewed by an institutional biosafety committee, or IBC, a local institutional committee that reviews and oversees basic and clinical research conducted at that institution. The IBC assesses the safety of the research and identifies any potential risk to public health or the environment.

Human clinical trials for biologic products are typically conducted in three sequential phases that may overlap or be combined:

- Phase 1. The biological product is initially introduced into healthy human subjects and tested for safety. In the case of some products for severe or life-threatening diseases, especially when the product may be too inherently toxic to ethically administer to healthy volunteers, the initial human testing is often conducted in patients.
- Phase 2. The biological product is evaluated in a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the product for specific targeted diseases and to determine dosage tolerance, optimal dosage and dosing schedule.
- Phase 3. Clinical trials are undertaken to further evaluate dosage, clinical efficacy, potency, and safety in an expanded patient population at geographically dispersed clinical trial sites. These clinical trials are intended to establish the overall risk to benefit ratio of the product and provide an adequate basis for product labeling.

Post-approval clinical trials, sometimes referred to as Phase 4 clinical trials, may be conducted after initial marketing approval. These clinical trials are used to gain additional experience from the treatment of patients in the intended therapeutic indication, particularly for long-term safety follow-up.

During all phases of clinical development, regulatory agencies require extensive monitoring and auditing of all clinical activities, clinical data, and clinical trial investigators. Annual progress reports detailing the progress of the clinical trials must be submitted to the FDA. Written IND safety reports must be promptly submitted to the FDA and the investigators for serious and unexpected adverse events, any findings from other studies, tests in laboratory

animals or in vitro testing that suggest a significant risk for human patients, or any clinically important increase in the rate of a serious suspected adverse reaction over that listed in the protocol or investigator brochure. The sponsor must submit an IND safety report within 15 calendar days after the sponsor determines that the information qualifies for reporting. The sponsor also must notify the FDA of any unexpected fatal or life-threatening suspected adverse reaction within seven calendar days after the sponsor's initial receipt of the information. Phase 1, Phase 2 and Phase 3 clinical trials may not be completed successfully within any specified period, if at all. The FDA or the sponsor or its data safety monitoring board may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research patients are being exposed to an unacceptable health risk, including risks inferred from other unrelated immunotherapy trials. Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution if the clinical trial is not being conducted in accordance with the IRB's requirements or if the biological product has been associated with unexpected serious harm to patients.

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Human immunotherapy products are a new category of therapeutics. This is a relatively new and expanding area of novel therapeutic interventions, and therefore there is uncertainty as to the length of the trial period, the number of patients the FDA will require to be enrolled in the clinical trials in order to establish the safety, efficacy, purity and potency of immunotherapy products, and the eventual quality of data to be generated in these clinical trials for the FDA to support marketing approval.

Concurrently with clinical trials, companies usually complete additional studies and must also develop additional information about the physical characteristics of the biological product, as well as finalize a process for manufacturing the product in commercial quantities in accordance with cGMP requirements. To help reduce the risk of the introduction of adventitious agents with use of biological products, the PHSA emphasizes the importance of manufacturing control for products whose attributes cannot be precisely defined. The manufacturing process must be capable of consistently producing quality batches of the product candidate and, among other things, the sponsor must develop methods for testing the identity, strength, quality, potency and purity of the final biological product. Additionally, appropriate packaging must be selected and tested, and stability studies must be conducted to demonstrate that the biological product candidate does not undergo unacceptable deterioration over its shelf life.

Federal law requires that we register all of our clinical trials on a publicly accessible website, and accordingly we disclose information on our clinical trials on www.clinicaltrials.gov. We must also provide results information for most of our clinical trials, other than Phase 1 clinical trials.

U.S. Review and Approval Processes

After the completion of clinical trials of a biological product, FDA approval of a BLA must be obtained before commercial marketing of the biological product. The BLA must include results of product development, laboratory and animal studies, human trials, information on the manufacture and composition of the product, proposed labeling and other relevant information. The FDA may grant deferrals for submission of certain data or full or partial waivers. The testing and approval processes require substantial time and effort and there can be no assurance that the FDA will accept the BLA for filing and, even if filed, that any approval will be granted on a timely basis, if at all.

Under the Prescription Drug User Fee Act, or PDUFA, as amended, each BLA must be accompanied by a significant user fee. The FDA adjusts the PDUFA user fees on an annual basis. The PDUFA also imposes an annual program fee for approved biological products. Fee waivers or reductions are available in certain circumstances, including a waiver of the application fee for the first application filed by a small business. Additionally, no user fees are assessed on BLAs for products designated as orphan drugs, unless the application also includes a non-orphan indication.

Within 60 days following submission of the application, the FDA reviews a BLA submitted to determine if it is substantially complete before the agency accepts it for filing. The FDA may refuse to file any BLA that it deems incomplete or not properly reviewable at the time of submission and may request additional information. In this event, the BLA must be resubmitted with the additional information. The resubmitted application also is subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review of the BLA. The FDA reviews the BLA to determine, among other things, whether the proposed product is safe, potent, and/or effective for its intended use, and has an acceptable purity profile, and whether the product is being manufactured in accordance with cGMP to assure and preserve the product's identity, safety, strength, quality, potency and purity. The FDA may refer applications for novel biological products or biological products that present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions. During the biological product approval process, the FDA also will determine whether a Risk Evaluation and Mitigation Strategy, or REMS, is necessary to assure the safe use of the biological product. If the FDA concludes a REMS is needed, the sponsor of the BLA must submit a proposed REMS. The FDA will not approve a BLA without a REMS, if required.

Before approving a BLA, the FDA will inspect the facilities at which the product is manufactured. The FDA will not approve the product 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. For immunotherapy products, the FDA also will not approve the product if the manufacturer is not in compliance with the

GTPs, to the extent applicable. These are FDA regulations and guidance documents that govern the methods used in, and the facilities and controls used for, the manufacture of HCT/Ps. The primary intent of the GTP requirements is to ensure that cell and tissue-based products are manufactured in a manner designed to prevent the introduction, transmission and spread of communicable disease. FDA regulations also require HCT/P establishments to register and list their HCT/Ps with the FDA and, when applicable, to evaluate donors through screening and testing. Additionally, before approving a BLA, the FDA will typically inspect one or more clinical sites to assure that the clinical trials were conducted in compliance with IND trial requirements and GCP requirements. To maintain compliance with CGMPs, GTPs, and GCPs, an applicant must incur significant expenditure of time, money and effort in the areas of training, record keeping, production, and quality control.

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Notwithstanding the submission of relevant data and information, the FDA may ultimately decide that the BLA does not satisfy its regulatory criteria for approval and deny approval. Data obtained from clinical trials are not always conclusive and the FDA may interpret data differently than we interpret the same data. If the agency decides not to approve the BLA in its present form, the FDA will issue a complete response letter that describes all of the specific deficiencies in the BLA identified by the FDA. The deficiencies identified may be minor, for example, requiring labeling changes, or major, for example, requiring additional clinical trials. Additionally, the complete response letter may include recommended actions that the applicant might take to place the application in a condition for approval. If a complete response letter is issued, the applicant may either resubmit the BLA, addressing all of the deficiencies identified in the letter, or withdraw the application.

If a product receives regulatory approval, the approval may be significantly limited to specific diseases and dosages or the indications for use may otherwise be limited, which could restrict the commercial value of the product.

Further, the FDA may require that certain contraindications, warnings or precautions be included in the product labeling. The FDA may impose restrictions and conditions on product distribution, prescribing, or dispensing in the form of a REMS or other risk management plan, or otherwise limit the scope of any approval. In addition, the FDA may require post marketing clinical trials, sometimes referred to as Phase 4 clinical trials, designed to further assess a biological product's safety and effectiveness, and testing and surveillance programs to monitor the safety of approved products that have been commercialized.

In addition, under the Pediatric Research Equity Act, or PREA, a BLA or supplement to a BLA must contain data to assess the safety and effectiveness of the product for the claimed indications in all relevant pediatric subpopulations and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The FDA may grant deferrals for submission of data or full or partial waivers. Unless otherwise required by regulation, the PREA does not apply to any product for an indication for which orphan designation has been granted. However, if only one indication for a product has orphan designation, a pediatric assessment may still be required for any applications to market that same product for the non-orphan indication(s). Sponsors in satisfaction of this obligation may receive an additional six months of marketing exclusivity for all dosage forms and all indications with the same active moiety as the drug studied.

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 generally a disease or condition that affects fewer than 200,000 individuals in the U.S., or more than 200,000 individuals in the U.S. and for which there is no reasonable expectation that the cost of developing and making available in the U.S. a drug or biologic for this type of disease or condition will be recovered from sales in the U.S. 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 shorten the duration of the regulatory review or approval process, but does provide certain advantages, such as a waiver of PDUFA fees, enhanced access to FDA staff, and potential waiver of the PREA requirements discussed above.

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 product exclusivity, which means that the FDA may not approve any other applications, including a full BLA, to market the same biologic for the same indication for seven years, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity. 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 user 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 U.S. 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.

Expedited Development and Review Programs

The FDA has a Fast Track program that 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, or if the drug has been designated as a qualified infectious disease product. Fast Track designation applies to the combination of the product and the specific indication for which it is being studied. Under Fast Track, 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. Even if Fast Track designation is granted, it may be rescinded if the product no longer meets the qualifying criteria.

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Any product, submitted to the FDA for approval, including a product with a Fast Track designation, may also be eligible for other types of FDA programs intended to expedite development and review, such as priority review and accelerated approval. A product is eligible for priority review if it treats a serious condition and, if approved, would provide a significant improvement in safety and efficacy. The FDA will attempt to direct additional resources to the evaluation of an application for a new product designated for priority review in an effort to facilitate the review. Additionally, a product may be eligible for accelerated approval. 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 treats a serious condition, provides a meaningful advantage over available therapies, and demonstrates 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 approval, the FDA may require that a sponsor of a drug or biological product receiving accelerated approval perform appropriate post-marketing clinical studies to verify and describe the predicted 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. The FDCA also provides expedited procedures for FDA withdrawal of approval of a product approved through accelerated approval. Fast Track designation, priority review and accelerated approval do not change the standards for approval but may expedite the development or approval process.

Breakthrough Therapy Designation is intended to expedite the development and review of products that treat serious or life-threatening conditions. The designation requires preliminary clinical evidence that may demonstrate substantial improvement on a clinically significant endpoint over available therapies. The designation includes all of the Fast Track program features, as well as more intensive FDA interaction and guidance, organizational commitment, and other potential actions to expedite review. The Breakthrough Therapy Designation is a distinct status from both accelerated approval and priority review, which can also be granted to the same product if relevant criteria are met. If a product is designated as breakthrough therapy, the FDA will expedite the development and review of such product. Even if a Breakthrough Therapy Designation is granted, it may be rescinded if the product no longer meets the qualifying criteria.

Where applicable, we plan to request Fast Track and Breakthrough Therapy Designation for our product candidates, including rivo-cel BPX-601, and BPX-603. Even if we receive one or both of these designations for our product candidates, the FDA may later decide that product candidates no longer meet the conditions for Fast Track or Breakthrough Therapy Designation and withdraw such designations. These designations do not change the standards for approval or guarantee that any designated product will be approved by the FDA

Post-Approval Requirements

Any product for which we receive FDA approval is subject to continuing regulation by the FDA, including, among other things, record-keeping requirements, reporting of adverse experiences with the product, providing the FDA with updated safety and efficacy information, product sampling and distribution requirements, and complying with FDA promotion and advertising requirements, which include, among others, standards for direct-to-consumer advertising, restrictions on promoting products for uses or in patient populations that are not described in the product's approved uses, known as "off-label use," limitations on industry-sponsored scientific and educational activities, and requirements for promotional activities involving the internet. Although physicians may prescribe legally available products for off-label uses, if the physicians deem it to be appropriate in their professional medical judgment, manufacturers may not market or promote such off-label uses.

In addition, quality control and manufacturing procedures must continue to conform to applicable manufacturing requirements after approval to ensure the long-term stability of the product. We rely, and expect to continue to rely, on third parties for the production of clinical and commercial quantities of our products in accordance with cGMP regulations. cGMP regulations require among other things, quality control and quality assurance as well as the corresponding maintenance of records and documentation and the obligation to investigate and correct any deviations from cGMP. Manufacturers and other entities involved in the manufacture and distribution of approved products 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 and other laws. Accordingly, manufacturers must continue to expend time, money, and effort in the area of production and quality control to maintain cGMP compliance. Discovery of problems with a product after approval may result in restrictions on a product, manufacturer, or holder of an approved BLA, including, among other things, recall or withdrawal of the product from the market, seizure of product manufactured not in accordance with GMPs, suspension or termination of manufacturing activities at one or more facilities, or other civil or criminal sanctions. In addition, changes to the manufacturing process are strictly regulated, and depending on the significance of the change, may require prior FDA approval before being implemented. Other types of changes to the approved product, such as adding new indications and claims, are also subject to further FDA review and approval.

The FDA also may require post-marketing testing, known as Phase 4 testing, and surveillance to monitor the effects of an approved product. Discovery of previously unknown problems with a product or the failure to comply with applicable FDA requirements can

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have negative consequences, including adverse publicity, judicial or administrative enforcement, warning letters from the FDA, mandated corrective advertising or communications with doctors, and civil or criminal penalties, among others. Newly discovered or developed safety or effectiveness data may require changes to a product's approved labeling, including the addition of new warnings and contraindications, and also may require the implementation of a REMS or other risk management measures. Also, new government requirements, including those resulting from new legislation, may be established, or the FDA's policies may change, which could delay or prevent regulatory approval of our products under development.

Other U.S. Healthcare Laws and Compliance Requirements

In the U.S., 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, or HHS, such as the Office of Inspector General, the U.S. Department of Justice, or DOJ, and individual U.S. Attorney offices within the DOJ, and state and local governments. For example, sales, marketing and scientific/educational grant programs must comply with the anti-fraud and abuse provisions of the Social Security Act, the false claims laws, the privacy provisions of the Health Insurance Portability and Accountability Act, or HIPAA, the sunshine provisions of the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, collectively, the Affordable Care Act, and similar state laws, each as amended.

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 either the referral of an individual for, or the for purchasing, leasing, ordering or arranging for the purchase, lease or order of any good, facility, 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 Anti-Kickback Statute has been interpreted to apply to arrangements between biologic manufacturers on one hand and prescribers, purchasers, and formulary managers 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 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.

Additionally, the intent standard under the Anti-Kickback Statute was amended by the Affordable Care Act 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. The Anti-Kickback Statute may be violated if only one purpose of the remuneration is to induce referrals. In addition, the Affordable Care Act 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 civil False Claims Act.

The civil monetary penalties law imposes penalties against any person or entity who, among other things, is determined to have presented or caused to be presented a claim to a federal health program that the person knows or should know is for an item or service that was not provided as claimed or is false or fraudulent.

The federal false claims laws, including but not limited to the federal civil False Claims Act, prohibit, among other things, any person or entity from knowingly presenting, or causing to be presented, a false claim for payment to, or approval by, the federal government. 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, that is, off-label, and thus non-reimbursable, uses.

HIPAA created new federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud or to obtain, by means of false or fraudulent pretenses, representations or promises, any money or property owned by, or under the control or custody of, any healthcare benefit program, including private

third-party payors and knowingly and willfully falsifying, concealing or covering up by trick, scheme or device, a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services.

Also, many states have similar 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.

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, imposes requirements relating to the privacy, security and transmission of individually identifiable health information. Among other things, HITECH makes HIPAA's security standards directly applicable to business associates independent

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contractors or agents of covered entities that receive or obtain protected health information in connection with providing a service on behalf of a covered entity. 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 the federal HIPAA laws and seek attorneys' fees and costs associated with pursuing federal civil actions. In addition, state laws govern the privacy and security of health information in specified circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

Additionally, the federal Physician Payments Sunshine Act, and its implementing regulations, require that certain manufacturers of drugs, devices, biological and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program, with certain exceptions, to report annually 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 require that certain manufacturers and group purchasing organizations report annually certain ownership and investment interests held by physicians and their immediate family members.

We will also be required to begin satisfying the product tracing, verification, and reporting requirements set out in the Drug Quality and Security Act.

In order to distribute products commercially, we must also 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.

Several states have enacted legislation requiring pharmaceutical and biotechnology companies to, among other things, 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.

If our operations are found to be in violation of any of the federal and state healthcare laws described above or any other 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, additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, 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, 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 obtain regulatory approval. In the U.S. and markets in other countries, sales of any products for which we receive regulatory approval for commercial sale will depend, in part, on the extent to which third-party payors provide coverage and establish adequate reimbursement levels for such products. In the U.S., third-party payors include federal and state healthcare programs, private managed care providers, health insurers and other organizations. The process for determining whether a third-party payor will provide coverage for a product may be separate from the process for setting the price of a product or for establishing the reimbursement rate that such a payor will pay for the product. Third-party payors may limit coverage to specific products on an approved list, also known as a formulary, which might not include all of the FDA-approved products for a particular indication. 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. We may need to conduct expensive pharmaco-economic studies in order to demonstrate the medical necessity and cost-effectiveness of our

products, in addition to the costs required to obtain the FDA approvals. Our product candidates may not be considered medically necessary or cost-effective. A payor's decision to provide coverage for a product does not imply that an adequate reimbursement rate will be approved. Further, one payor's determination to provide coverage for a product does not assure that other payors will also provide coverage for the product. Adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in product development.

Different pricing and reimbursement schemes exist in other countries. In the EU, 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

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downward pressure on health care costs has become very 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 adequate coverage and reimbursement. In addition, emphasis on managed care in the U.S. has increased and we expect will continue to increase the pressure on healthcare pricing. 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 March 2010, President Obama signed the Affordable Care Act, which was intended to broaden access to health insurance, improve quality, and reduce or constrain the growth of healthcare spending among other health policy reforms. The Affordable Care Act has substantially changed healthcare financing and delivery by both governmental and private insurers, and continues to significantly impact the pharmaceutical and biotechnology industry. The Affordable Care Act has changed existing government healthcare programs and resulted in the development of new programs.

Among the Affordable Care Act's 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;
- 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, or AMP;
- a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% 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 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 Public Health Service pharmaceutical pricing program; and
- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research.

Since January 2017, President Trump has signed two Executive Orders designed to delay the implementation of certain provisions of the PPACA or otherwise circumvent some of the requirements for health insurance mandated by the PPACA. Concurrently, Congress has considered legislation that would repeal, or repeal and replace, all or part of the PPACA. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the PPACA have been signed into law. Legislation enacted in 2017 (H.R. 1, "An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018"), informally titled the Tax Cuts and Jobs Act, includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the PPACA 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 PPACA-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. Congress may consider other legislation to

replace elements of the PPACA.

There have also been changes to the reimbursement landscape in the U.S. since the passage of the Affordable Care Act. On August 2, 2011, President Obama signed into law the Budget Control Act of 2011, which, among other things, created the Joint Select Committee on Deficit Reduction to recommend to Congress proposals in spending reductions. The Joint Select Committee did not achieve a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, triggering the legislation's automatic reduction to several government programs. This includes reductions to Medicare payments to providers of 2% per fiscal year, which

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went into effect on April 1, 2013, and, due to subsequent legislative amendments will stay in effect through 2025 unless additional Congressional action is taken. On January 2, 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, which, among other things, reduced Medicare payments to several providers, including hospitals, imaging centers and cancer treatment centers and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. Further, there has been heightened governmental scrutiny recently over the manner in which manufacturers set prices for their marketed products. For example, there have been several recent Congressional inquiries and proposed bills designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, reduce the cost of drugs under Medicare, and reform government program reimbursement methodologies for drug products. We expect that additional state and federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for our products and/or additional pricing pressure. In addition, it is possible that there will be further legislation or regulation that could harm our business, financial condition, and results of operations.

The Foreign Corrupt Practices Act

The Foreign Corrupt Practices Act, or 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 U.S. to comply with accounting provisions requiring the company 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.

Rest of World Government Regulation

In addition to regulations in the U.S., we will be subject to a variety of regulations in other jurisdictions governing, among other things, clinical trials and any commercial sales and distribution of our products. Whether or not we obtain FDA approval of a product, we must obtain the requisite approvals from regulatory authorities in foreign countries prior to the commencement of clinical trials or marketing of the product in those countries. Certain countries outside of the U.S. have a similar process that requires the submission of a clinical trial application much like the IND prior to the commencement of human clinical trials. In the EU, for example, a clinical trial application must be submitted to each country’s national health authority and an independent ethics committee, much like the FDA and IRB, respectively. Once the clinical trial application is approved in accordance with a country’s requirements, clinical trial development may proceed. Because biologically sourced raw materials are subject to unique contamination risks, their use may be restricted in some countries. The requirements and process governing the conduct of clinical trials, product licensing, pricing and reimbursement vary from country to country. In all cases, the clinical trials are conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

European Marketing Authorizations

In order to market a new medicinal product in the European Union, a company must submit and obtain approval from regulators of a marketing authorization application, or MAA. The process for doing this depends, among other things, on the nature of the medicinal product.

The centralized procedure results in a single marketing authorization, or MA, granted by the European Commission that is valid across the EEA (i.e., the European Union as well as Iceland, Liechtenstein and Norway). The centralized procedure is compulsory for human drugs that are: (i) derived from biotechnology processes, such as genetic engineering, (ii) contain a new active substance indicated for the treatment of certain diseases, such as HIV/AIDS, cancer, diabetes, neurodegenerative diseases, autoimmune and other immune dysfunctions and viral diseases, (iii) officially designated orphan medicines and (iv) advanced-therapy medicines, such as gene therapy, somatic cell therapy or tissue-engineered medicines. The centralized procedure may at the request of the applicant also be used in certain other cases. Therefore, the centralized procedure would be mandatory for the products we are developing. Under the centralized procedure in the European Union, the maximum timeframe for the evaluation of an MAA by the EMA is 210 days. This excludes so-called clock stops, during which additional written or oral information is to be provided by the applicant in

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response to questions asked by the CHMP. At the end of the review period, the CHMP provides an opinion to the European Commission. If this is opinion favorable, the Commission may then adopt a decision to grant an MA. In exceptional cases, the CHMP might perform an accelerated review of an MAA in no more than 150 days. This is usually when the product is of major interest from the point of view of public health and, in particular, from the viewpoint of therapeutic innovation.

The European Commission may grant a so-called "marketing authorization under exceptional circumstances". Such authorization is intended for products for which the applicant can demonstrate that it is unable to provide comprehensive data on the efficacy and safety under normal conditions of use, because the indications for which the product in question is intended are encountered so rarely that the applicant cannot reasonably be expected to provide comprehensive evidence, or in the present state of scientific knowledge, comprehensive information cannot be provided, or it would be contrary to generally accepted principles of medical ethics to collect such information. Consequently, marketing authorization under exceptional circumstances may be granted subject to certain specific obligations, which may include the following:

- the applicant must complete an identified program of studies within a time period specified by the competent authority, the results of which form the basis of a reassessment of the benefit/risk profile;
- the medicinal product in question may be supplied on medical prescription only and may in certain cases be administered only under strict medical supervision, possibly in a hospital and in the case of a radiopharmaceutical, by an authorized person; and
- the package leaflet and any medical information must draw the attention of the medical practitioner to the fact that the particulars available concerning the medicinal product in question are as yet inadequate in certain specified respects.

A marketing authorization under exceptional circumstances is subject to annual review to reassess the risk-benefit balance in an annual reassessment procedure. Continuation of the authorization is linked to the annual reassessment and a negative assessment could potentially result in the marketing authorization being suspended or revoked. The renewal of a marketing authorization of a medicinal product under exceptional circumstances, however, follows the same rules as a "normal" marketing authorization. Thus, a marketing authorization under exceptional circumstances is granted for an initial five years, after which the authorization will become valid indefinitely, unless the EMA decides that safety grounds merit one additional five-year renewal.

Named Patient Programmes (NPPs)

Many jurisdictions allow the supply of unauthorized medicinal products in the context of strictly regulated and exceptional early access programs, and some countries may provide reimbursement for drugs provided in the context of such programs. In the European Union, the legal basis for early access programs, also referred to as named-patient and compassionate use programs, is set out in the E.U. legislation regulating the authorization, manufacture, distribution and marketing of medicinal products. Detailed regulatory requirements applicable to early access programs have been adopted and implemented by the E.U. member states in their national laws. The promotion, advertising and marketing of unauthorized medicinal products is generally prohibited, and authorization for NPPs must generally be obtained from national competent authorities, which might not grant such authorization.

Employees

As of December 31, 2018, we had 173 employees, all of whom were full-time, 143 of whom were engaged in research and development activities and 30 of whom were engaged in business development, finance, information systems, facilities, human resources or administrative support. None of our employees is subject to a collective bargaining agreement. We consider our relationship with our employees to be good.

Corporate Information

We were incorporated in Delaware in July 2004. Our principal executive offices are located at 2130 W. Holcombe Blvd., Ste. 800, Houston, Texas and our telephone number is (832) 384-1100. Our corporate website address is www.bellicum.com. Our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to reports filed pursuant to Sections 13(a) and 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, will be made available free of charge on our website as soon as reasonably practicable after we electronically file such material with, or furnish it to, the Securities and Exchange Commission, or the SEC. The contents of our website are not incorporated into this Annual Report and our reference to the URL for

our website is intended to be an inactive textual reference only.

We are an “emerging growth company,” as defined in the JOBS Act. We will remain an emerging growth company until the earlier of (a) December 31, 2019, (b) the last day of the fiscal year in which we have total annual gross revenue of at least $1.0 billion (c) the last day of the fiscal year 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 exceeded $700.0 million as of the prior June 30th, or (d) the date on which we have issued more than $1.0 billion in non-convertible debt during the prior three-year period. References to “emerging growth company” in this Annual Report on Form 10-K have the meaning associated with it in the JOBS Act.

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ITEM 1A. Risk Factors

Our business and results of operations are subject to a number of risks and uncertainties. You should carefully consider the following risk factors, as well as the other information in this report, and in our other public filings. The occurrence of any of the following risks could harm our business, financial condition, results of operations and/or growth prospects or cause our actual results to differ materially from those contained in forward-looking statements we have made in this report and those we may make from time to time. You should consider all of the risk factors described when evaluating our business.

Risks Related to Our Business and Industry

We have incurred net losses in every year since our inception and anticipate that we will continue to incur net losses in the future.

We are a clinical stage biopharmaceutical company with a limited operating history. We are not profitable, have no products approved for commercial sale and have incurred significant losses since our inception in 2004. To date, we have financed our operations primarily through equity and debt financings. For the fiscal years ended December 31, 2018 and 2017, we reported a net loss of $98.0 million and $91.8 million, respectively.

As of December 31, 2018, we had an accumulated deficit of $420.5 million. We expect to continue to incur significant losses for the foreseeable future, and we expect these losses to increase as we continue our research and development of, and seek regulatory approvals for, our product candidates.

In addition, if we obtain regulatory approval of and seek to commercialize any of our product candidates, we will likely incur significant sales, marketing and manufacturing expenses and may continue to incur substantial research and development expenses for additional post-marketing approval development requirements related to such product. We may encounter unforeseen expenses, difficulties, complications, delays and other unknown factors that may adversely affect our business. The size of our future net losses will depend, in part, on the rate of future growth of our expenses and our ability to generate revenue. Our prior losses and expected future losses have had and will continue to have an adverse effect on our stockholders' equity and working capital.

We will require significant funding to complete the development and commercialization of our product candidates. If we fail to obtain additional financing, we may have to delay, reduce or eliminate our development programs or commercialization efforts.

Our operations have consumed substantial amounts of cash since our inception. We expect to continue to spend substantial amounts to continue the preclinical and clinical development of our product candidates and other research and development programs.

As of December 31, 2018, we had cash and cash equivalents of approximately $48.7 million and total investments in marketable securities of $49.3 million. We maintain our cash, cash equivalents, and marketable securities with high quality, accredited financial institutions. These amounts at times may exceed federally insured limits. Cash and cash equivalents and investments in marketable securities, or a total of $98.0 million, may not be sufficient to fund our operating expenses and capital expenditure requirements through the first quarter of 2020. However, changing circumstances may cause us to consume capital significantly faster than we currently anticipate.

We expect to finance future cash needs through public or private equity offerings, debt financings, strategic partnerships and alliances or licensing arrangements. We cannot be certain that additional funding will be available on acceptable terms, or at all. Subject to limited exceptions, our loan agreement with Oxford Finance prohibits us from incurring indebtedness without the prior written consent of Oxford. If we are unable to raise additional capital in sufficient amounts or on terms acceptable to us we will need to significantly delay, scale back or discontinue the development or commercialization of our product candidates. We also could be required to:

- seek collaborators for one or more of our current or future product candidates on terms that are less favorable than might otherwise be available;
- relinquish or license on unfavorable terms our rights to technologies or product candidates that we otherwise would seek to develop or commercialize ourselves; or
- seek a third party to acquire us or our assets.

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Any of the above events could significantly harm our business, prospects, financial condition and results of operations and cause the price of our common shares to decline.

Biopharmaceutical product development is a highly speculative undertaking and involves a substantial degree of uncertainty. We have never generated any revenue from product sales and may never be profitable.

We have devoted substantially all of our financial resources and efforts to developing our proprietary CID technology platform, identifying potential product candidates and conducting preclinical studies and clinical trials. We are in the early stages of developing our product candidates, and we have not completed development of any products. Our ability to generate revenue and achieve profitability depends in large part on our ability, alone or with partners, to successfully complete the development of, obtain the necessary regulatory approvals for, and commercialize, product candidates. We do not anticipate generating revenues from sales of products for the foreseeable future. Our ability to generate future revenues from product sales depends heavily on our success in:

- completing requisite clinical trials through all phases of clinical development of rivo-cel and our other current product candidates;
- seeking and obtaining marketing approvals for rivo-cel and any other product candidates that successfully complete clinical trials, if any;
- launching and commercializing rivo-cel and other product candidates for which we obtain marketing approval, if any, with a partner or, if launched independently, successfully establishing a sales force, marketing and distribution infrastructure;
- identifying and developing new product candidates;
- progressing our pre-clinical programs into human clinical trials;
- establishing and maintaining supply and manufacturing relationships with third parties;
- developing new molecular switches based on our proprietary CID technology platform;
- maintaining, protecting, expanding and enforcing our intellectual property; and
- attracting, hiring and retaining qualified personnel.

Because of the numerous risks and uncertainties associated with biologic product development, we are unable to predict the likelihood or timing for when we may receive regulatory approval of rivo-cel or any of our other current or future product candidates or when we will be able to achieve or maintain profitability, if ever. If we do not receive regulatory approvals, our business, prospects, financial condition and results of operations will be adversely affected. Even if we obtain the regulatory approvals to market and sell one or more of our product candidates, we may never generate significant revenues from any commercial sales for several reasons, including because the market for our products may be smaller than we anticipate, or products may not be adopted by physicians and payors or because our products may not be as efficacious or safe as other treatment options. If we fail to successfully commercialize one or more products, we may be unable to generate sufficient revenues to sustain and grow our business and our business, prospects, financial condition and results of operations will be adversely affected. In addition, our expenses could increase beyond expectations if we are required by the European Medicines Agency, or EMA, the FDA, or other foreign regulatory agencies, to perform studies and clinical trials in addition to those that we currently anticipate for rivo-cel and our other product candidates, or if there are any delays in our or our partners completing clinical trials or the development of any of our product candidates. Further, if one or more of the product candidates that we independently develop is approved for commercial sale, we expect to incur significant costs associated with commercializing any such product candidates. Finally, even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis.

The EMA and/or FDA may disagree with our regulatory plans and we may fail to obtain regulatory approval of our product candidates.

Our business and future success depends, in part, on our ability to obtain regulatory approval of and then successfully commercialize rivo-cel and our other clinical product candidates. All of our product candidates, including rivo-cel, will require additional clinical and non-clinical development, regulatory review and approval in multiple jurisdictions, substantial investment, and access to sufficient commercial manufacturing capacity and significant marketing efforts before we can expect to generate any revenue from product sales.

Rivo-cel and our other product candidates could fail to receive regulatory approval for many reasons, including the following:

- the EMA, FDA or comparable foreign regulatory authorities may disagree with the design or implementation of our clinical trials;

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- we may be unable to demonstrate to the satisfaction of the EMA, FDA or comparable foreign regulatory authorities that our product candidates have the necessary safety, purity, and potency for any of their proposed indications;
- the results of clinical trials may not meet the level of statistical significance required by the EMA, FDA or comparable foreign regulatory authorities for approval;
- we may be unable to demonstrate that our product candidates' clinical and other benefits outweigh their safety risks;
- we may encounter serious and unexpected adverse events during clinical trials that render our products unsafe for use in humans;
- the EMA, FDA or comparable foreign regulatory authorities may disagree with our interpretation of data from preclinical studies or clinical trials;
- the data collected from clinical trials of our product candidates may not be sufficient to the satisfaction of the EMA, FDA or comparable foreign regulatory authorities to support the submission of an MAA, BLA or other comparable submission in foreign jurisdictions or to obtain regulatory approval in Europe, the U.S. or elsewhere;
- the EMA, FDA or comparable foreign regulatory authorities may fail to approve our manufacturing processes and/or facilities of third-party manufacturers with which we contract for clinical and commercial supplies; and
- the approval policies or regulations of the EMA, FDA or comparable foreign regulatory authorities may significantly change in a manner rendering our clinical data insufficient for approval.

We plan to initially seek approval for rivo-cel and rimiducid from the EMA for the treatment of pediatric patients undergoing haploidentical (partial match) hematopoietic stem cell transplants, or HSCT, and to submit the MAAs for this indication in 2019. While we expect that the European arm of our BP-004 trial could serve as the registrational trial for these MAAs, this clinical trial was not originally designed for that purpose. We cannot be certain that our preclinical and clinical trial package for the MAAs will be sufficient for approval of rivo-cel for multiple reasons including issues related to trial conduct and analysis; limitations of data available from pre-clinical and Phase 1/2 studies; or issues related to CMC efforts to date. We have sought to avoid or remediate potential issues but we cannot be sure that such efforts will be effective or sufficient. Further, we cannot assure you that the EMA or any other regulatory agency will agree that rivo-cel provides a clinically meaningful and differentiated therapeutic benefit or that the side effects experienced in our clinical trials yield an acceptable benefit/risk ratio in the opinion of the EMA or other regulatory agencies. If the MAAs for rivo-cel are deficient, we will incur additional expense to address the deficiencies, which may require additional clinical trials, and the commercialization of rivo-cel will be delayed. This would adversely affect our business, results of operations and prospects.

We are currently conducting a pivotal randomized Phase 2/3 global clinical trial, called THRIVE, for rivo-cel in adult and adolescent patients 12 years and older with intermediate and high-risk AML or MDS. This trial is intended to provide the basis for approval of rivo-cel in the U.S. and expansion of the label in Europe. However, the general approach for FDA approval of a new biologic or drug is to require dispositive data from two adequate and well-controlled, Phase 3 clinical trials of the relevant biologic or drug in the relevant patient population. Phase 3 clinical trials typically involve hundreds of patients, have significant costs and take years to complete. We believe that a single Phase 3 clinical trial strategy is warranted given the limited alternatives for patients for whom rivo-cel therapy is potentially beneficial, but the FDA may ultimately require more than one Phase 3 clinical trial and may limit clinical trial designs allowed to serve as a registration trial.

In addition, because rivo-cel is our most advanced product candidate, and because many of our other product candidates are based on similar technology, if rivo-cel encounters safety or efficacy problems, developmental delays, regulatory issues or other problems, our development plans and business for our other product candidates would be significantly harmed.

Our CID technology is novel and largely unproven.

Our proprietary CID technology platform is novel and there are no approved products or third-party product candidates in late-stage clinical trials based on this technology. Additionally, the safety and efficacy profile of rimiducid has not been subject to large scale clinical testing. If rimiducid is found to have a poor safety profile in clinical trials, or if our technology is not effective, we may be required to redesign all of our product candidates, which would require significant time and expense. In addition, our CID platform technology may not be applicable or effective in the development of additional cellular immunotherapies beyond our current programs which would

adversely affect our business and prospects.

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T cell therapies are novel and present significant challenges.

CAR T and TCR product candidates represent a relatively new field of cellular immunotherapy. Advancing this novel and personalized therapy creates significant challenges for us, including:

- obtaining regulatory approval, as the EMA, FDA and other regulatory authorities have limited experience with commercial development of T-cell therapies for cancer;
- sourcing clinical and, if approved, commercial supplies for the materials used to manufacture and process our product candidates;
- developing a consistent and reliable process, while limiting contamination risks, for engineering and manufacturing T cells ex vivo and infusing the engineered T cells into the patient;
- educating medical personnel regarding the potential safety benefits, as well as the challenges, of incorporating our product candidates into their treatment regimens;
- establishing sales and marketing capabilities upon obtaining any regulatory approval to gain market acceptance of a novel therapy; and
- the availability of coverage and adequate reimbursement from third-party payors for our novel and personalized therapy.

Our inability to successfully develop CAR T and TCR cell therapies or develop processes related to the manufacture or commercialization of these therapies would adversely affect our business, results of operations and prospects.

Our clinical trials may fail to adequately demonstrate the safety and efficacy of any of our product candidates, which would prevent or delay regulatory approval and commercialization.

Clinical testing is expensive, takes many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process and our product candidates are subject to the risks of failure inherent in biologic drug development. Success in early clinical trials does not mean that later clinical trials will be successful because product candidates in later-stage clinical trials may fail to demonstrate sufficient safety or efficacy despite having progressed through initial clinical testing, even at statistically significant levels. We will be required to demonstrate through clinical trials that our product candidates are safe and effective for use in the target indication before we can obtain regulatory approvals for commercial sale. Companies frequently suffer significant setbacks in late-stage clinical trials, even after earlier clinical trials have shown promising results and most product candidates that commence clinical trials are never approved as products. We expect there may be greater variability in results for cellular immunotherapy products processed and administered on a patient-by-patient basis like all our CID technology-based development and product candidates than for “off-the-shelf” products, like many drugs.

If any of our product candidates fail to demonstrate sufficient safety or efficacy, we would experience potentially significant delays in, or be required to abandon our development of the product candidate, which would have a material and adverse impact on our business, prospects, financial condition and results of operations.

Many of our current product candidates are in early stage clinical trials, and we may experience unfavorable results in the future.

We have begun enrolling patients in Phase 1 clinical trials of BPX-601 for the treatment of pancreatic, gastric, and prostate cancers and BPX-701 for the treatment of refractory or relapsed AML/MDS and uveal melanoma. We have not initiated clinical trials for any additional preclinical product candidates and we may not be able to commence clinical trials on the time frames we expect. As these product candidates are in early stages of development, we face significant uncertainty regarding how effective and safe they will be in human patients and the results from preclinical studies, such as in vitro and in vivo studies, of BPX-601 and BPX-701 and our other preclinical programs may not be indicative of the results of clinical trials of these product candidates. Preclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval for their products.

Even if clinical trials are successfully completed, the FDA or foreign regulatory authorities may not interpret the results as we do, and more clinical trials could be required before we submit our product candidates for approval. To

the extent that the results of our clinical trials are not satisfactory to the FDA or foreign regulatory authorities for support of a marketing application, approval of our product candidates may be significantly delayed, or we may be required to expend significant additional resources, which may not be available to us, to conduct additional clinical trials in support of potential approval of our product candidates.

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We may not be successful in our efforts to use and expand our CID platform to build a pipeline of product candidates and develop marketable products.

We believe that our CID platform, which serves as the foundation of our CaspaCIDe and GoCAR-T technologies, can be further leveraged to discover other novel technologies, therapeutic applications and market opportunities. For example, we are developing new molecular switches and dual-switch systems to provide greater control over cellular immunotherapy. We are at an early stage of development and our platform has not yet, and may never lead to, approved or marketable products. Even if we are successful in continuing to build our pipeline, the potential product candidates that we identify may not be suitable for clinical development, including for reasons related to their harmful side effects, limited efficacy or other characteristics that indicate that they are unlikely to be products that will receive marketing approval and achieve market acceptance. If we do not successfully develop and commercialize product candidates based upon our technological approach, we may not be able to obtain product or partnership revenues in future periods, which would adversely affect our business, prospects, financial condition and results of operations.

We rely and will continue to rely on third parties to conduct our clinical trials. If these third parties do not successfully carry out their contractual duties or meet expected deadlines, we may not be able to obtain regulatory approval of or commercialize our product candidates.

We depend and will continue to depend upon independent investigators and collaborators, such as universities, medical institutions, and strategic partners to conduct our preclinical and clinical trials under agreements with us. Negotiations of budgets and contracts with study sites may result in delays to our development timelines and increased costs. We will rely heavily on these third parties over the course of our clinical trials, and we control only certain aspects of their activities. Nevertheless, we are responsible for ensuring that each of our studies is conducted in accordance with applicable protocol, legal, regulatory and scientific standards, and our reliance on third parties does not relieve us of our regulatory responsibilities. We and these third parties are required to comply with current good clinical practices, or cGCPs, which are regulations and guidelines enforced by the FDA and comparable foreign regulatory authorities for product candidates in clinical development. Regulatory authorities enforce these cGCPs through periodic inspections of clinical trial sponsors, principal investigators and clinical trial sites. If we or any of these third parties fail to comply with applicable cGCP regulations, the clinical data generated in our clinical trials may be deemed unreliable and the FDA or comparable foreign regulatory authorities could require us to perform additional clinical trials before approving our marketing applications. It is possible that, upon inspection, such regulatory authorities could determine that any of our clinical trials fail to comply with the cGCP regulations. In addition, our clinical trials must be conducted with biologic product produced under current good manufacturing practices, or cGMPs, and will require a large number of test patients. Our failure or any failure by these third parties to comply with these regulations or to recruit a sufficient number of patients may require us to repeat clinical trials, which would delay the regulatory approval process. Moreover, our business may be implicated if any of these third parties violates federal or state fraud and abuse or false claims laws and regulations or healthcare privacy and security laws.

Any third parties conducting our clinical trials are and will not be our employees and, except for remedies available to us under our agreements with these third parties, we cannot control whether they devote sufficient time and resources to our ongoing preclinical, clinical and nonclinical programs. These third parties may also have relationships with other commercial entities, including our competitors, for whom they may also be conducting clinical trials or other drug development activities, which could affect their performance on our behalf. If these third parties do not successfully carry out their contractual duties or obligations or meet expected deadlines, if they need to be replaced or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements or for other reasons, our clinical trials may be extended, delayed or terminated and we may not be able to complete development of, obtain regulatory approval of or successfully commercialize our product candidates. As a result, our financial results and the commercial prospects for our product candidates would be harmed, our costs could increase and our ability to generate revenue could be delayed.

Switching or adding third parties to conduct our clinical trials involves substantial cost and requires extensive management time and focus. In addition, there is a natural transition period when a new third party commences work. As a result, delays occur, which can materially impact our ability to meet our desired clinical development timelines.

Also, we are conducting multiple clinical trials in Europe and may plan additional testing of our technology and product candidates in other foreign jurisdictions. We currently have limited staffing and capabilities in foreign countries and may not be able to effectively resolve potential disputes with our independent investigators and collaborators.

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If we encounter difficulties enrolling patients in our clinical trials, our clinical development activities could be delayed or otherwise adversely affected.

We may experience difficulties in patient enrollment in our clinical trials for a variety of reasons. The timely completion of clinical trials in accordance with their protocols depends, among other things, on our ability to enroll a sufficient number of patients who remain in the study until its conclusion. The enrollment of patients depends on many factors, including:

- the patient eligibility criteria defined in the protocol;
- the size of the patient population required for analysis of the trial's primary endpoints;
- the proximity of patients to study sites;
- the design of the clinical trial;
- our ability to recruit clinical trial investigators with the appropriate competencies and experience;
- our ability to obtain and maintain patient consents;
- the risk that patients enrolled in clinical trials will drop out of the clinical trials before completion; and
- competing clinical trials and approved therapies available for patients.

In particular, some of our clinical trials will look to enroll patients with characteristics which are found in a very small population, for example, patients with rare cancers with specific attributes that are targeted with our product candidates. Our clinical trials will compete with other companies' clinical trials for product candidates that are in the same therapeutic areas as our product candidates, and this competition will reduce the number and types of patients available to us, because some patients who might have opted to enroll in our clinical trials may instead opt to enroll in a trial being conducted by one of our competitors. Since the number of qualified clinical investigators is limited, we expect to conduct some of our clinical trials at the same clinical trial sites that some of our competitors use, which will reduce the number of patients who are available for our clinical trials in these clinical trial sites. Moreover, because our product candidates represent a departure from more commonly used methods for cancer treatment, potential patients and their doctors may be inclined to use conventional therapies, such as chemotherapy and antibody therapy, rather than enroll patients in any of our future clinical trials. Patients may also be unwilling to participate in our clinical trials because of negative publicity from adverse events in the biotechnology or gene therapy industries. Delays in patient enrollment may result in increased costs or may affect the timing or outcome of the planned clinical trials, which could prevent completion of these clinical trials and adversely affect our ability to advance the development of our product candidates.

Any adverse developments that occur during any clinical trials conducted by academic investigators, our collaborators or other entities conducting clinical trials under independent INDs may affect our ability to obtain regulatory approval or commercialize our product candidates.

Rimiducid and rivo-cel are being used by third parties in clinical trials for which we are collaborating or in clinical trials which are completely independent of our development programs. We have little to no control over the conduct of those clinical trials. If serious adverse events occur during these or any other clinical trials using our product candidates, the FDA and other regulatory authorities may delay, limit or deny approval of our product candidate or require us to conduct additional clinical trials as a condition to marketing approval, which would increase our costs. If we receive regulatory approval for any product candidate and a new and serious safety issue is identified in clinical trials conducted by third parties, the applicable regulatory authorities may withdraw their approval of the product or otherwise restrict our ability to market and sell our product. In addition, treating physicians may be less willing to administer our product due to concerns over such adverse events, which would limit our ability to commercialize our product.

Adverse side effects or other safety risks associated with our product candidates could delay or preclude approval, cause us to suspend or discontinue clinical trials, abandon product candidates, limit the commercial profile of an approved label, or result in significant negative consequences following marketing approval, if any.

In third party clinical trials involving CAR T cells, the most prominent acute toxicities included symptoms thought to be associated with the release of cytokines, such as fever, low blood pressure and kidney dysfunction. Some patients also experienced toxicity of the central nervous system, such as confusion, cranial nerve dysfunction and speech

impairment. Adverse side effects attributed to CAR T cells were severe and life-threatening in some patients. The life-threatening events were related to kidney dysfunction and toxicities of the central nervous system. Severe and life-threatening toxicities occurred primarily in the first two weeks after cell infusion and generally resolved within three weeks. In the past, several patients have also died in clinical trials by others involving CAR T cells.

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Undesirable side effects observed in our clinical trials, whether or not they are caused by our product candidates, could result in the delay, suspension or termination of clinical trials by us, the FDA or other regulatory authorities for a number of reasons. In addition, because the patients in our clinical trials are suffering from life-threatening diseases, are often suffering from multiple complicating conditions and, in the case of transplant patients, are in a position of extreme immune deficiency at the time that they receive our therapy, it may be difficult to accurately assess the relationship between our product candidates and adverse events experienced by very ill patients. For example, in January 2018, we announced that we had received notice from the FDA that a clinical hold had been placed on our U.S. clinical trials of rivo-cel following three cases of encephalopathy deemed as possibly related to rivo-cel. In April 2018, we announced that the FDA had lifted the clinical hold following consultation between us and the FDA and agreement on amendments to the study protocols, including guidance on monitoring and management of certain neurologic adverse events. The FDA or foreign regulatory authorities, including in Europe, could in the future take similar actions, which would harm our business. If we elect or are required to delay, suspend or terminate any clinical trial of any product candidates that we develop, the commercial prospects of such product candidates will be harmed and our ability to generate product revenues from any of these product candidates will be delayed or eliminated. Serious adverse events observed in clinical trials could hinder or prevent market acceptance of the product candidate at issue. Any of these occurrences may harm our business, prospects, financial condition and results of operations significantly.

Clinical trials are expensive, time-consuming and difficult to design and implement.

Human clinical trials are expensive and difficult to design and implement, in part because they are subject to rigorous regulatory requirements. Because our product candidates are based on relatively new technology and engineered on a patient-by-patient basis, we expect that they will require extensive research and development and have substantial manufacturing and processing costs. In addition, costs to treat patients with relapsed/refractory cancer and to treat potential side effects that may result from therapies such as our current and future product candidates can be significant. Accordingly, our clinical trial costs are likely to be significantly higher than for more conventional therapeutic technologies or drug products. In addition, our proposed personalized product candidates involve several complex and costly manufacturing and processing steps, the costs of which will be borne by us. The costs of our clinical trials may increase if the FDA does not agree with our clinical development plans or requires us to conduct additional clinical trials to demonstrate the safety and efficacy of our product candidates.

We face significant competition from other biotechnology and pharmaceutical companies, and our operating results will suffer if we fail to compete effectively.

The biopharmaceutical industry is characterized by intense competition and rapid innovation. Our competitors may be able to develop other compounds or drugs that are able to achieve similar or better results. Our potential competitors include major multinational pharmaceutical companies, established biotechnology companies, specialty pharmaceutical companies and universities and other research institutions. Many of our competitors have substantially greater financial, technical and other resources, such as larger research and development staff and experienced marketing and manufacturing organizations and well-established sales forces. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large, established companies. Mergers and acquisitions in the biotechnology and pharmaceutical industries may result in even more resources being concentrated in our competitors. Competition may increase further as a result of advances in the commercial applicability of technologies and greater availability of capital for investment in these industries. Our competitors, either alone or with collaborative partners, may succeed in developing, acquiring or licensing on an exclusive basis drug or biologic products that are more effective, safer, more easily commercialized or less costly than our product candidates or may develop proprietary technologies or secure patent protection that we may need for the development of our technologies and products. We believe the key competitive factors that will affect the development and commercial success of our product candidates are efficacy, safety, tolerability, reliability, convenience of use, price and reimbursement.

Specifically, genetically engineering T cells faces significant competition from multiple companies, including Adaptimmune, Allogene Therapeutics, Inc., Atara Biotherapeutics, Inc., Autolus Therapeutics plc, bluebird bio, Inc., Celgene Corporation, Cellectis SA, Cell Medica Limited, GlaxoSmithKline plc, Intrexon Corporation, Immune

Design Corp., Gilead Sciences, Inc., Iovance Biotherapeutics, Inc., Kiadis Pharma B.V., Medigene AG, MolMed S.p.A., Mustang Bio, Inc., Novartis AG, Poseida Therapeutics, Precision Biosciences, Inc., Unum Therapeutics, and Ziopharm Oncology.

Our rivo-cel product candidate is designed to improve HSCT outcomes by addressing risks of disease relapse, infections and GVHD control. Other companies are developing product candidates to improve the outcome of HSCT, including Kiadis Pharma Netherlands B.V., MolMed S.p.A., and Gamida Cell Ltd. Even if we obtain regulatory approval of our product candidates, the availability and price of our competitors' products could limit the demand and the price we are able to charge for our product candidates. We may not be able to implement our business plan if the acceptance of our product candidates is inhibited by price competition or the reluctance of physicians to switch from existing methods of treatment to our product candidates, or if physicians

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switch to other new drug or biologic products or choose to reserve our product candidates for use in limited circumstances. For additional information regarding our competition, see “Item 1. Business-Competition” under Part I of our Annual Report.

Rivo-cel and rimiducid have received orphan drug designation, but we may be unable to maintain or receive the benefits associated with orphan drug status, including market exclusivity.

The FDA or EMA grant orphan designation to a drug or biologic intended to treat a rare disease or condition or for which there is no reasonable expectation that the cost of developing and making available in that jurisdiction a drug or biologic for a disease or condition will be recovered from sales in that jurisdiction for that drug or biologic. If a product that has orphan drug designation subsequently receives the first FDA or EMA approval for the disease for which it has such designation, the product is entitled to orphan product exclusivity, which means that the FDA or EMA may not approve any other applications, including a full authorization to market the same biologic for the same indication for seven years in the U.S. and for 10 years in Europe, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity.

The EMA has granted orphan drug designations to rivo-cel for treatment following HSCT, and for the activator agent, rimiducid for the treatment of GvHD. Additionally, rivo-cel and rimiducid have received orphan drug designation from the FDA, as a combination replacement T-cell therapy for the treatment of immunodeficiency and GvHD after allogeneic HSCT. However, in each case, exclusive marketing rights may be limited if we seek approval for an indication broader than the orphan designated indication and may be lost if the EMA or FDA, as applicable, later determines that the request for designation was materially defective or if we are unable to assure the availability of sufficient quantities of the product to meet the needs of patients with the rare disease or condition. Although the respective designations may provide seven years of market exclusivity in the U.S. and ten years of market exclusivity in Europe, the designations are subject to certain limited exceptions. Therefore, even though we have obtained orphan drug designation for certain indications, we may be unable to obtain orphan drug designation for our future product candidates and we may not be the first to obtain marketing approval for any particular orphan indication.

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 Medical Officer and our Executive Vice President of Technical Operations. 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.

To induce valuable employees to remain at our company, in addition to salary and cash incentives, we have provided stock options and restricted stock units or (RSUs) that vest over time. The value to employees of stock options and RSUs 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 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. We do not maintain “key man” 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 scientific and medical personnel.

We will need to grow the size of our organization, and we may experience difficulties in managing this growth.

As our development and commercialization plans and strategies develop, including the preparations for a potential launch of rivo-cel in Europe, we expect to need additional managerial, medical, operational, sales, marketing, market access financial and other personnel. Future growth imposes significant added responsibilities on members of management, including:

- identifying, recruiting, integrating, maintaining and motivating additional employees;
-

managing our internal development efforts effectively, including the clinical and regulatory review process for our product candidates, while complying with our contractual obligations to contractors and other third parties; and improving our operational, financial and management controls, reporting systems and procedures.

There are a small number of individuals with experience in cell therapy and the competition for these individuals is high. Our future financial performance and our ability to 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 a disproportionate amount of its attention

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away from day-to-day activities to devote a substantial amount of time to managing these growth activities. We currently rely, and for the foreseeable future will continue to rely, in substantial part on certain independent organizations, advisors and consultants to provide certain services, including substantially all aspects of regulatory approval, clinical management, and manufacturing. The services of independent organizations, advisors and consultants may not continue to be available to us on a timely basis when needed, and we may not be able to find qualified replacements. In addition, if we are unable to effectively manage our outsourced activities or if the quality or accuracy of the services provided by consultants is compromised for any reason, our clinical trials may be extended, delayed or terminated, and we may not be able to obtain regulatory approval of our product candidates or otherwise advance our business. We may not be able to manage our existing consultants or find other competent outside contractors and consultants on economically reasonable terms, or at all.

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.

The terms of our debt facility place restrictions on our operating and financial flexibility, and failure to comply with covenants or to satisfy certain conditions of the agreement governing the debt facility may result in acceleration of our repayment obligations and foreclosure on our pledged assets, which could significantly harm our liquidity, financial condition, operating results, business and prospects and cause the price of our common stock to decline.

In December 2017, we entered into a loan and security agreement with Oxford Finance LLC, or Oxford, that is secured by a lien covering substantially all of our assets, excluding intellectual property, but including proceeds from the sale, license, or disposition of our intellectual property, under which we have borrowed $35.0 million. The loan and security agreement governing the debt facility requires us to comply with a number of covenants (affirmative and negative), including restrictive covenants that limit our ability to: incur additional indebtedness; encumber the collateral securing the loan; acquire, own or make investments; repurchase or redeem any class of stock or other equity interest; declare or pay any cash dividend or make a cash distribution on any class of stock or other equity interest; transfer a material portion of our assets; acquire other businesses; and merge or consolidate with or into any other organization or otherwise suffer a change in control, in each case subject to exceptions. Our intellectual property also is subject to customary negative covenants. In addition, subject to limited exceptions, Oxford could declare an event of default upon the occurrence of any event that it interprets as having a material adverse effect upon our business, operations, properties, assets, or financial condition or upon our ability to perform or pay the secured obligations under the loan and security agreement or upon the collateral or Oxford's liens on the collateral under the agreement, thereby requiring us to repay the loan immediately, together with a prepayment charge of up to 3% of the then outstanding principal balance and an end-of-term charge. Although, in and of itself, the occurrence of adverse results or delays in any clinical study or the denial, delay or limitation of approval of or taking of any other regulatory action by the FDA or another governmental entity will not constitute a material adverse effect under our loan and security agreement with Oxford, Oxford may determine that such an event together with contemporaneous events or circumstances constitutes a material adverse effect upon our business, operations, properties, assets, or financial condition or upon our ability to perform or pay the secured obligations under the loan and security agreement. If we default under the facility, Oxford may accelerate all of our repayment obligations and, if we are unable to access funds to meet those obligations or to renegotiate our agreement, Oxford could take control of our pledged assets and we could immediately cease operations. If we were to renegotiate our agreement under such circumstances, the terms may be significantly less favorable to us. If we were liquidated, Oxford's right to repayment would be senior to the rights of our stockholders to receive any proceeds from the liquidation. Any declaration by Oxford of an event of default could significantly harm our liquidity, financial condition, operating results, business, and prospects and cause the price of our common stock to decline.

We may incur additional indebtedness in the future. The debt instruments governing such indebtedness may contain provisions that are as, or more, restrictive than the provisions governing our existing indebtedness under the loan and security agreement with Oxford. If we are unable to repay, refinance or restructure our indebtedness when payment is

due, the lenders could proceed against the collateral or force us into bankruptcy or liquidation.

If the London Inter-Bank Offered Rate, or LIBOR, is discontinued, interest payments under our credit agreement may be calculated using another reference rate.

In July 2017, the Chief Executive of the United Kingdom Financial Conduct Authority, or FCA, which regulates LIBOR, announced that the FCA intends to phase out the use of LIBOR by the end of 2021. In addition, the U.S. Federal Reserve, in conjunction with the Alternative Reference Rates Committee, a steering committee comprised of large U.S. financial institutions, is considering replacing U.S. dollar LIBOR with the Secured Overnight Financing Rate, or SOFR, a new index calculated by short-term repurchase agreements, backed by Treasury securities. Although there have been certain issuances utilizing SOFR, it is unknown whether this or any other alternative reference rate will attain market acceptance as a replacement for LIBOR. U.S. dollar LIBOR is used as a benchmark rate in our credit agreement with Oxford Finance LLC, and such credit agreement does not provide fallback language for all circumstances in which U.S. dollar LIBOR ceases to be published. There remains uncertainty

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regarding the future utilization of LIBOR and the nature of any replacement rate, and any potential effects of the transition away from LIBOR on us are not known. The transition process may involve, among other things, increased volatility and illiquidity in markets for instruments that currently rely on LIBOR and may result in increased borrowing costs, the effectiveness of related transactions such as hedges, uncertainty under applicable documentation, including our credit agreement with Oxford Finance LLC, or difficult and costly processes to amend such documentation. As a result, our ability to refinance our credit agreement or other indebtedness or to hedge our exposure to floating rate instruments may be impaired, which would adversely affect the operations of our business.

We need to oversee manufacturing of a complex supply chain of cellular therapy product candidates, viral vectors and small molecule drugs. We expect to rely on third parties to manufacture a substantial portion of our clinical cell therapy product candidates, viral vectors and small molecule supplies in Europe.

Because of the complex nature of our products, we need to oversee the manufacture of multiple components that require a diverse knowledge base and appropriate manufacturing personnel. The supply chain for these components is separate and distinct, and no single manufacturer can supply more than one component of each of our products. Additionally, it is likely that the cell therapy products will need to be made within an appropriate geographic location for the area in which the products will be utilized, so one cell therapy manufacturing facility may not be able to supply diverse geographic areas. Any lack of capabilities to store, freeze, thaw and infuse our cell therapies would adversely affect our business and prospects.

We do not currently own a European facility that may be used as our clinical-scale manufacturing and processing facility, and must currently rely on outside vendors to manufacture supplies and process our product candidates, which is and will need to be done on a patient-by-patient basis. We have not yet caused our product candidates to be manufactured or processed on a commercial scale. We may not be able to scale patient-by-patient manufacturing and processing to satisfy clinical or commercial demands for any of our product candidates. In addition, our anticipated reliance on a limited number of third-party manufacturers for manufacturing in Europe exposes us to the following risks:

- We may be unable to identify manufacturers on acceptable terms or at all because the number of potential manufacturers is limited, and any replacement contractor must be approved by the EMA. This approval would require new testing and compliance inspections. In addition, a new manufacturer would have to be educated in, or develop substantially equivalent processes for, production of our products after receipt of regulatory approval, if any.
- Our third-party manufacturers might be unable to timely formulate and manufacture our product or produce the quantity and quality required to meet our clinical and commercial needs, if any.
- Our future contract manufacturers may not perform as agreed or may not remain in the contract manufacturing business for the time required to supply our clinical trials or to successfully produce, store and distribute our products.
- Manufacturers are subject to ongoing periodic unannounced inspection by regulatory agencies to ensure strict compliance with cGMP and other government regulations and standards. We do not have control over third-party manufacturers' compliance with these regulations and standards.
- We may not own, or may have to share, the intellectual property rights to any improvements made by our third-party manufacturers in the manufacturing process for our products.
- Our third-party manufacturers could breach or terminate their agreement with us.

Each of these risks could delay our clinical trials, the approval, if any of our product candidates by the EMA or the commercialization of our product candidates in Europe or result in higher costs or deprive us of potential product revenue. In addition, we will rely on third parties to perform release tests on our product candidates prior to delivery to patients. If these tests are not appropriately done and test data are not reliable, patients could be put at risk of serious harm.

The results of the United Kingdom's referendum on withdrawal from the European Union may have a negative effect on global economic conditions, financial markets and our business.

The United Kingdom is currently negotiating the terms of its exit from the European Union, often referred to as "Brexit, which is scheduled for March 29, 2019. In November 2018, the United Kingdom and the European Union agreed upon a draft withdrawal agreement, including a transition period from March 29, 2019 through December 31, 2020 to allow time for a future trade agreement to be agreed. On January 15, 2019, the withdrawal agreement was

rejected by the U.K. Parliament, creating significant uncertainty about the terms under which the United Kingdom will leave the European Union. If no agreement can be reached and the United Kingdom leaves the European Union with no agreement, there will be a period of considerable uncertainty, particularly with respect to the free movement of goods, services, people, data and capital between the United Kingdom and the European Union. We may also face new regulatory costs and challenges that could have a material adverse effect on our operations. In this regard, the EMA has already issued a notice reminding marketing authorization holders of centrally authorized medicinal products

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for human and veterinary use of certain legal requirements that need to be considered as part of Brexit. Examples of the impact Brexit could have on our business, financial condition or results of operations include:

- regulatory uncertainty, notably United Kingdom legal entities (like our subsidiary Bellicum Pharma Limited) will no longer be eligible to apply for or hold centralized drug applications such as orphan drug designations and Marketing Authorization Applications;
- legal uncertainty and potentially divergent national laws and regulations as the United Kingdom determines which European Union laws and directives to replace or replicate, or where previously implemented by enactment of United Kingdom laws or regulations, to retain, amend or repeal; and
- various geopolitical forces that may impact the global economy and our business, including, for example, other E.U. member states in which we have operations proposing referendums to, or electing to, exit the European Union.

We have limited information available regarding the ultimate cost of our products, and cannot estimate what the cost of our products will be upon commercialization, should that occur.

We do not yet have sufficient information to reliably estimate the cost of the commercial manufacturing and processing of our product candidates, and the actual cost to manufacture and process our product candidates could materially and adversely affect the commercial viability of our product candidates, including rivo-cel. As a result, we may never be able to develop a commercially viable product. Because of the patient-specific nature of our manufacturing process, it is not amenable to traditional “scale up” to manufacture larger lots as is performed for traditional drugs and biological agents.

We have begun limited in-house manufacturing at our own manufacturing facility for supply of U.S. clinical product candidate requirements, and anticipated using this facility to meet US commercial cell therapy product requirements. This will require significant resources and expertise and we may fail to successfully complete or grow our manufacturing capabilities as planned, which could adversely affect our clinical trials and the commercial viability of our product candidates.

We have completed the buildout of manufacturing space at our leased headquarters in Houston, Texas and have begun in-house clinical supply manufacturing. We also rely on outside vendors to manufacture clinical supplies and process intermediates to support our clinical trials. Internal manufacturing for clinical trial and future commercial use will rely upon finding personnel with appropriate background and training to staff and operate the facility on a daily basis. Should we be unable to find these individuals, we may need to rely on external contractors longer than anticipated, and train additional personnel to fill the needed roles. There are a small number of individuals with experience in cell therapy and the competition for these individuals is high.

Specifically, the operation of a cell-therapy manufacturing facility is a complex endeavor requiring knowledgeable individuals who have successful previous experience in cleanroom environments. Cell therapy facilities, like other biological agent manufacturing facilities, require appropriate commissioning and validation activities to demonstrate that they operate as designed. Additionally, each manufacturing process must be proven through the performance of process validation runs to guarantee that the facility, personnel, equipment, and process work as designed. While we have developed our own manufacturing processes using an in-house team, there is timing risk associated with increased in-house product manufacture.

The manufacture of our product candidates is complex and requires significant expertise and capital investment, including the development of advanced manufacturing techniques and process controls. Manufacturers of cell therapy products often encounter difficulties in production, particularly in scaling out and validating initial production and ensuring the absence of contamination. These include difficulties with production costs and yields, quality control, including stability of the product, quality assurance testing, operator error, shortages of qualified personnel, as well as compliance with strictly enforced federal, state and foreign regulations. Furthermore, if contaminants are discovered in our supply of product candidates or in our manufacturing facilities, the manufacturing facilities may need to be closed for an extended period to investigate and remedy the contamination. It is possible that stability or other issues relating to the manufacture of our product candidates could occur in the future.

Our product candidates currently are and will continue to be manufactured on a patient-by-patient basis. We have not yet manufactured our clinical trial product candidates on a large scale, nor on a commercial scale, and may not be able to achieve large scale clinical trial or commercial manufacturing and processing on our own to satisfy expected

clinical trial or commercial demands for any of our product candidates. While we believe that our current manufacturing and processing approaches are appropriate to support our clinical product development, we have limited experience in managing the T cell engineering process, and our processes may be more difficult or more expensive than anticipated. The manufacturing processes employed by us may not result in product candidates that will be safe and effective.

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Our manufacturing operations will be subject to review and oversight by the FDA upon commencement of the manufacturing of our product candidates for our planned Phase 3 clinical trials. We will have to complete facility validation, and must obtain approval from the FDA prior to licensure to manufacture our product candidates for these trials. Even if approved, we will continue to be subject to ongoing periodic unannounced inspection by the FDA, the Drug Enforcement Administration and corresponding state agencies to ensure strict compliance with current good manufacturing practices and other government regulations. Our license to manufacture product candidates will be subject to continued regulatory review.

We do not yet have sufficient information to reliably estimate the cost of commercial manufacturing and processing of our product candidates. The actual cost to manufacture and process our product candidates could materially and adversely affect the commercial viability of our product candidates. As a result, we may never be able to develop a commercially viable product.

We also may fail to manage the logistics of collecting and shipping patient material to our manufacturing site and shipping the product candidate back to the patient. Logistical and shipment delays and problems, whether or not caused by us or our vendors, could prevent or delay the delivery of product candidates to patients.

In addition, it is possible that we could experience manufacturing difficulties in the future due to resource constraints or because of labor disputes. If we were to encounter any of these difficulties, our ability to provide our product candidates to patients could be materially adversely affected.

Cell-based therapies rely on the availability of specialty raw materials, which may not be available to us on acceptable terms or at all.

Gene-modified cell therapy manufacture requires many specialty raw materials, some of which are manufactured by small companies with limited resources and experience to support a commercial product. Some suppliers typically support biomedical researchers or blood-based hospital businesses and may not have the capacity to support commercial products manufactured under cGMP by biopharmaceutical firms. The suppliers may be ill-equipped to support our needs, especially in non-routine circumstances like an EMA or FDA inspection or medical crisis, such as widespread contamination. We also do not have commercial supply arrangements with many of these suppliers, and may not be able to contract with them on acceptable terms or at all. Accordingly, we may experience delays in receiving key raw materials to support clinical or commercial manufacturing.

In addition, some raw materials are currently available from a single supplier, or a small number of suppliers. We cannot be sure that these suppliers will remain in business, or that they will not be purchased by one of our competitors or another company that is not interested in continuing to produce these materials for our intended purpose.

We currently have a limited commercial organization and as a company have no experience in marketing cell therapy products. If we are unable to enhance our market access, marketing and sales capabilities or enter into agreements with third parties to market and sell our product candidates, we may not be able to generate product revenue.

We have established a European subsidiary, Bellicum Pharma Limited, that is focused on preparations for potential commercialization of rivo-cel in Europe. We have hired an experienced General Manager with commercial and operational experience and are hiring additional professionals experienced in market access, marketing and sales of pharmaceutical and biotechnology products. This team has very little experience in commercializing cell therapy products such as rivo-cel and the Company has never successfully commercialized any product candidate. We intend to expand and enhance our in-house marketing organization and plan to recruit a sales force, which will require significant capital expenditures, management resources and time. We will have to compete with other pharmaceutical and biotechnology companies to recruit, hire, train and retain marketing and marketing, sales and other commercial personnel.

If we are unable or decide not to expand our internal sales, marketing, market access and distribution capabilities, we will pursue collaborative arrangements regarding the sales and marketing of our products, however, we may not be able to establish or maintain such collaborative arrangements, or if we are able to do so, that they may not have effective sales forces. Any revenue we receive will depend upon the efforts of such third parties, which may not be successful. We may have little or no control over the marketing and sales efforts of such third parties and our revenue from product sales may be lower than if we had commercialized our product candidates ourselves. We also face

competition in our search for third parties to assist us with the sales and marketing efforts of our product candidates. We may not be able to expand our in-house market access, marketing, sales and distribution capabilities or establish or maintain relationships with third-party collaborators to commercialize any product in Europe or the U.S.

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A variety of risks associated with marketing our product candidates internationally could materially adversely affect our business.

We plan to seek regulatory approval of our product candidates, including rivo-cel, outside of the U.S. and, accordingly, we will be subject to additional risks related to operating in foreign countries if we obtain the necessary approvals, including:

- differing regulatory requirements in foreign countries;
- unexpected changes in tariffs, trade barriers, price and exchange controls and other regulatory requirements;
- economic weakness, including inflation, or political instability in particular foreign economies and markets;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- foreign taxes, including withholding of payroll taxes;
- foreign currency fluctuations, which could result in increased operating expenses and reduced revenue, and other obligations incident to doing business in another country;
- difficulties staffing and managing foreign operations;
- workforce uncertainty in countries where labor unrest is more common than in the U.S.;
- potential liability under the FCPA or comparable foreign regulations;
- challenges enforcing our contractual and intellectual property rights, especially in those foreign countries that do not respect and protect intellectual property rights to the same extent as the U.S.;
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad;
- differing payor reimbursement regimes, governmental payors or patient self-pay systems and price controls; and
- business interruptions resulting from geo-political actions, including war and terrorism.

These and other risks associated with our international operations may materially adversely affect our ability to attain or maintain profitable operations.

We may form or seek strategic alliances or enter into additional licensing arrangements in the future, and we may not realize the benefits of such alliances or licensing arrangements.

We may form or seek strategic alliances, create joint ventures or collaborations and enter into additional licensing arrangements with third parties that we believe will complement or augment our development and commercialization efforts with respect to our product candidates and any future product candidates that we may develop. Any of these relationships may require us to incur non-recurring and other charges, increase our near and long-term expenditures, issue securities that dilute our existing stockholders or disrupt our management and business. In addition, we face significant competition in seeking appropriate strategic partners and the negotiation process is time-consuming and complex. Moreover, 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 we license products or businesses, 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. It is possible that, following a strategic transaction or license, we may not achieve the revenue or specific net income that justifies such transaction. Any delays in entering into new strategic partnership agreements related to our product candidates could delay the development and commercialization of our product candidates in certain geographies for certain indications, which would harm our business prospects, financial condition and results of operations.

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 manufacture our drug substance and our drug product, and because we collaborate with various organizations and academic institutions on the advancement of our technology platform, we must, at times, 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, collaborative research agreements, consulting agreements or other similar agreements with our collaborators, advisors, employees 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, such as trade secrets. Despite these contractual provisions, 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.

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Given that our proprietary position is based, in part, on our know-how and trade secrets, a competitor's 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.

We may use our financial and human resources to pursue a particular research program or product candidate and fail to capitalize on programs or product candidates that may be more profitable or for which there is a greater likelihood of success.

Because we have limited resources, we may forego or delay pursuit of opportunities with certain programs or product candidates or for 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 for product candidates 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 relinquish valuable rights to that product candidate through strategic 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, or we may allocate internal resources to a product candidate in a therapeutic area in which it would have been more advantageous to enter into a partnering arrangement.

We and our contractors utilize hazardous materials in our business operations, and any claims relating to improper handling, storage, or disposal of these materials could harm our business.

Our activities involve the controlled use of potentially hazardous substances, including chemical and biological materials, by our third-party manufacturers. Our manufacturers are subject to federal, state and local laws and regulations in the U.S. governing the use, manufacture, storage, handling and disposal of medical and hazardous materials, and similar laws in other geographic regions. Although we believe that our manufacturers' procedures for using, handling, storing and disposing of these materials comply with legally prescribed standards, we cannot completely eliminate the risk of contamination or injury resulting from medical or hazardous materials. As a result of any such contamination or injury, we may incur liability or local, city, state or federal authorities may curtail the use of these materials and interrupt our business operations. In the event of an accident, we could be held liable for damages or penalized with fines, and the liability could exceed our resources. We do not have any insurance for liabilities arising from medical or hazardous materials. Compliance with applicable environmental laws and regulations is expensive, and current or future environmental regulations may impair our research, development and production efforts, which could harm our business, prospects, financial condition or results of operations.

Our internal computer systems, or those used by our clinical investigators, contractors or consultants, may fail or suffer security breaches.

Despite the implementation of security measures, our internal computer systems and those of our contractors and consultants are vulnerable to damage from computer viruses and unauthorized access. While we have not experienced any such material system failure or security breach to date, if such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our development programs and our business operations. For example, the loss of clinical trial data from completed or future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and the further development and commercialization of our product candidates could be delayed.

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System outages, network disruptions and cyber-security threats could interrupt the operation of our business.

We are dependent on the use of information technology systems for our operations. Outages, disruptions and threats could have an adverse impact on our ability to conduct operations. Cyber-security threats, such as malware, phishing and network attacks, are on the rise. These attacks can affect the availability of our information technology systems, including their data, as well as the confidentiality and integrity of these systems. A security breach poses a risk to confidential data, including but not limited to intellectual property and trade secrets resulting in financial, legal or reputational harm to us. Insider threats may exist if an individual authorized to access our technology systems improperly discloses sensitive data to unauthorized persons or the public. We also have outsourced elements of our operations, including elements of our information technology infrastructure, and thus manage several independent vendor relationships with third parties who may have access to our confidential information. Confidentiality agreements are in place for authorized users and third parties to support the prevention of confidential information being improperly disclosed. We have policies and procedures in place, including controls around the access and activity of authorized users, active system monitoring, back-up and recovery, information technology security and mandatory annual information technology security awareness training to assist in the prevention and mitigation of an outage, disruption or threat. In addition, we have invested in high availability, redundant technologies that will reduce the risk of an outage, disruption or threat. However, our efforts may not prevent an outage, disruption or threat that would materially adversely affect us. We also may not have sufficient liability insurance, either type or amount, to cover us against claims related to a cyber-security threat.

Business disruptions could seriously harm our future revenue and financial condition and increase our costs and expenses.

Our operations, and those of our clinical investigators, contractors and consultants, could be subject to power shortages, telecommunications failures, water shortages, floods, earthquakes, hurricanes, typhoons, fires, extreme weather conditions, medical epidemics and other natural or man-made disasters or business interruptions, for which we are predominantly self-insured. The occurrence of any of these business disruptions could seriously harm our operations and financial condition and increase our costs and expenses. We rely on third-party manufacturers to produce and process our product candidates on a patient by patient basis. Our ability to obtain clinical supplies of our product candidates could be disrupted if the operations of these suppliers are affected by a man-made or natural disaster or other business interruption.

Our employees, independent contractors, consultants, commercial partners and vendors may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements.

We are exposed to the risk of employee fraud or other illegal activity by our employees, independent contractors, consultants, commercial partners and vendors. Misconduct by these parties could include intentional, reckless and/or negligent conduct that fails to: comply with the laws of the FDA and other similar foreign regulatory bodies; provide true, complete and accurate information to the FDA and other similar foreign regulatory bodies, comply with manufacturing standards we have established, comply with healthcare fraud and abuse laws in the U.S. and similar foreign fraudulent misconduct laws, or report financial information or data accurately or to disclose unauthorized activities to us. If we obtain FDA approval of any of our product candidates and begin commercializing those products in the U.S., our potential exposure under such laws will increase significantly, and our costs associated with compliance with such laws are also likely to increase. These laws may impact, among other things, our current activities with principal investigators and research patients, as well as proposed and future sales, marketing and education programs. In particular, the promotion, sales and marketing of healthcare items and services, as well as certain business arrangements in the healthcare industry, are subject to extensive laws designed to prevent fraud, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, structuring and commission(s), certain customer incentive programs and other business arrangements generally. Activities subject to these laws also involve the improper use of information obtained in the course of patient recruitment for clinical trials. The laws that may affect our ability to operate include, but are not limited to:

- the federal Anti-Kickback Statute, which prohibits, among other things, knowingly and willfully soliciting, receiving, offering or paying any remuneration (including any kickback, bribe, or rebate), directly or indirectly, overtly or

covertly, in cash or in kind, to induce, or in return for, either the referral of an individual for, or the purchase, lease, order or recommendation of any good, facility, item or service for which payment may be made, in whole or in part, under a federal healthcare program, such as the Medicare and Medicaid programs;

- federal civil and criminal false claims laws and civil monetary penalties law, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, claims for payment or approval from Medicare, Medicaid, or other third-party payors that are false or fraudulent or knowingly making a false statement to improperly avoid, decrease or conceal an obligation to pay money to the federal government;

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- HIPAA, which created new federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program or obtain, by means of false or fraudulent pretenses, representations, or promises, any of the money or property owned by, or under the custody or control of, any healthcare benefit program, regardless of the payor (e.g., public or private) and knowingly and willfully falsifying, concealing or covering up by any trick or device a material fact or making any materially false statements in connection with the delivery of, or payment for, healthcare benefits, items or services relating to healthcare matters;
- HIPAA, as amended HITECH, and their respective implementing regulations, which impose requirements on certain covered healthcare providers, health plans, and healthcare clearinghouses as well as their respective business associates that perform services for them that involve the use, or disclosure of, individually identifiable health information, relating to the privacy, security and transmission of individually identifiable health information without appropriate authorization;
- the federal Physician Payment Sunshine Act, and its implementing regulations, which requires certain manufacturers of drugs, devices, biologicals and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to report annually to the HHS, information related to payments or other transfers of value made to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, as well as require certain manufacturers and group purchasing organizations to report annually ownership and investment interests held by physicians and their immediate family members;
- federal consumer protection and unfair competition laws, which broadly regulate marketplace activities and activities that potentially harm consumers; and
- foreign laws that govern the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by or are in conflict with HIPAA, including the European Union General Data Protection Regulation, or the GDPR, which became effective on May 25, 2018, and which imposes privacy and security obligations on any entity that collects and/or processes health data from individuals located in the European Union. Under the GDPR, fines of up to 20 million euros or up to 4% of the annual global turnover of the infringer, whichever is greater, could be imposed for significant non-compliance. As well as complicating our compliance efforts, non-compliance with these laws could result in penalties or significant legal liability. The GDPR includes more stringent operational requirements for processors and controllers of personal data and creates additional rights for data subjects. Additionally, Brexit could lead to further legislative and regulatory changes. While the Data Protection Act of 2018, that "implements" and complements the GDPR has achieved Royal Assent on May 23, 2018 and is now effective in the United Kingdom, it is still unclear whether transfer of data from the EEA to the United Kingdom will remain lawful under the GDPR. We may incur liabilities, expenses, costs, and other operational losses under the GDPR and applicable EU Member States and the United Kingdom privacy laws in connection with any measures we take to comply with them.

Additionally, we are subject to state and foreign equivalents of each of the healthcare laws described above, among others, some of which may be broader in scope and may apply regardless of the payor.

We have adopted a code of business conduct and ethics, but it is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent inappropriate conduct 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 be in compliance with such laws or regulations. Efforts to ensure that our business arrangements will comply with applicable healthcare laws may involve substantial costs. It is possible that governmental and enforcement authorities will conclude that our business practices may not comply with current or future statutes, regulations or case law interpreting applicable fraud and abuse or other healthcare laws and regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, including the imposition of civil, criminal and administrative penalties, damages, disgorgement, monetary fines, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, contractual damages, reputational harm, diminished profits and future earnings, individual imprisonment, additional reporting requirements and/or oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, and

curtailment of our operations, any of which could adversely affect our ability to operate our business and our results of operations. In addition, the approval and commercialization of any of our product candidates outside the U.S. will also subject us to foreign equivalents of the healthcare laws mentioned above, among other foreign laws.

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If product liability lawsuits are brought against us, we may incur substantial liabilities and may be required to limit commercialization of our product candidates.

We face an inherent risk of product liability as a result of the clinical testing of our product candidates and will face an even greater risk if we commercialize any products. For example, we may be sued if our product candidates cause or are perceived to cause injury or are found to be otherwise unsuitable during clinical testing, manufacturing, marketing or sale. Any such product liability claims may include allegations of defects in manufacturing, defects in design, a failure to warn of dangers inherent in the product, negligence, strict liability or a breach of warranties. Claims could also be asserted under state consumer protection acts. If we cannot successfully defend ourselves against product liability claims, we may incur substantial liabilities or be required to limit or cease commercialization of our product candidates. Even successful defense would require significant financial and management resources. Regardless of the merits or eventual outcome, liability claims may result in:

- decreased demand for our product candidates;
- injury to our reputation;
- withdrawal of clinical trial participants;
- initiation of investigations by regulators;
- costs to defend the related litigation;
- a diversion of management's time and our resources;
- substantial monetary awards to clinical trial participants or patients;
- product recalls, withdrawals or labeling, marketing or promotional restrictions;
- loss of revenue;
- exhaustion of any available insurance and our capital resources;
- the inability to commercialize any product candidate; and
- a decline in our share price.

Our inability to obtain sufficient product liability insurance at an acceptable cost to protect against potential product liability claims could prevent or inhibit the commercialization of any products we develop, alone or with corporate collaborators. We currently carry $10.0 million of product liability insurance covering our clinical trials, with other coverage limits as appropriate for certain foreign jurisdictions. Although we maintain such insurance, our insurance policies may have various exclusions, and we may be subject to a product liability claim for which we have no coverage. We may have to pay any amounts awarded by a court or negotiated in a settlement that exceed our coverage limitations or that are not covered by our insurance, and we may not have, or be able to obtain, sufficient capital to pay such amounts. Even if our agreements with any future corporate collaborators entitle us to indemnification against losses, such indemnification may not be available or adequate should any claim arise.

Comprehensive tax reform could adversely affect our business and financial condition.

On December 22, 2017, the president of the United States signed into law the Tax Cuts and Jobs Ac which significantly revises the Internal Revenue Code of 1986, as amended. The Tax Cuts and Jobs Ac, among other things, contains significant changes to corporate taxation, including reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, limitation of the tax deduction for interest expense to 30% of adjusted taxable income (except for certain small businesses), limitation of the deduction for net operating losses carried forward from taxable years beginning after December 31, 2017 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. Notwithstanding the reduction in the corporate income tax rate, the overall impact of the Tax Cuts and Jobs 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 Cuts and Jobs Act The impact of the Tax Cuts and Jobs Act on holders of our securities is likewise uncertain and could be adverse. We urge our stockholders to consult with their legal and tax advisors with respect to this legislation and the potential tax consequences of investing in or holding our securities.

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

As of December 31, 2018, we had aggregate U.S. and U.K. net operating loss carryforwards of approximately $303.0 million and $2.4 million, respectively, and aggregate U.S. federal and Texas state research and development credits of approximately $8.9 million

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and $4.7 million, respectively. These net operating loss carryforwards could expire unused and be unavailable to offset future income tax liabilities. Under the Tax Cuts and Jobs Act, federal net operating losses incurred in taxable years ending after December 31, 2017 may be carried forward indefinitely, but the deductibility of federal net operating losses generated in tax years beginning after December 31, 2017 is limited. It is uncertain if and to what extent various states will conform to the Tax Cuts and Jobs Act. In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, and corresponding provisions of state law, if a corporation undergoes an "ownership change" (which is generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period), the corporation's ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes to offset its post-change income or taxes may be limited. We may have experienced one or more ownership changes in the past and we may also experience additional ownership changes in the future as a result of subsequent shifts in our stock ownership, some of which may be outside of our control. If an ownership change occurs and our ability to use our net operating loss carryforwards is materially limited, it would harm our future operating results by effectively increasing our future tax obligations.

Risks Related to Government Regulation

The FDA regulatory approval process is lengthy and time-consuming, and we may experience significant delays in the clinical development and regulatory approval of our product candidates.

We have not previously submitted an MAA or a BLA to the EMA or FDA, or similar approval filings to other foreign authorities. An MAA/BLA must include extensive preclinical and clinical data and supporting information to establish the product candidate's safety, purity and potency for each desired indication. It must also include significant information regarding the chemistry, manufacturing and controls for the product. We expect the novel nature of our product candidates to create further challenges in obtaining regulatory approval. For example, the FDA has limited experience with commercial development of T cell therapies for cancer. In addition, the cell and gene therapy office of the FDA has limited experience with combination products that include a small molecule component. Approval of our product candidates, including rivo-cel, will require this FDA office to consult with another division of the FDA, which may result in further challenges in obtaining regulatory approval, including in developing final product labeling. The regulatory approval pathway for our product candidates may be uncertain, complex, expensive and lengthy, and approval may not be obtained.

We may also experience delays in completing planned clinical trials for a variety of reasons, including delays related to:

- the availability of financial resources to commence and complete our planned clinical trials;
- reaching agreement on acceptable terms with prospective clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different clinical trial sites;
- recruiting suitable patients to participate in a clinical trial;
- having patients complete a clinical trial or return for post-treatment follow-up;
- clinical trial sites deviating from clinical trial protocol, failing to follow GCPs, or dropping out of a clinical trial;
- adding new clinical trial sites; or
- manufacturing sufficient quantities of qualified materials under cGMPs and applying them on a subject by subject basis for use in clinical trials.

For example, in January 2018 we announced that we had received notice from the FDA that a clinical hold had been placed on our U.S. clinical trials of rivo-cel following three cases of encephalopathy deemed as possibly related to rivo-cel. In April 2018, we announced that the FDA had lifted the clinical hold following consultation between us and the FDA and agreement on amendments to the study protocols, including guidance on monitoring and management of certain neurologic adverse events.

Also, before a clinical trial can begin at an NIH-funded institution, that institution's independent institutional review board, or IRB, and its Institutional Biosafety Committee must review the proposed clinical trial to assess the safety of the trial. In addition, adverse developments in clinical trials of gene therapy products conducted by others may cause the FDA or other regulatory bodies to change the requirements for approval of any of our product candidates.

We could also encounter delays if physicians encounter unresolved ethical issues associated with enrolling patients in clinical trials of our product candidates in lieu of prescribing existing treatments that have established safety and

efficacy profiles. Further, a clinical trial may be suspended or terminated by us, the IRBs for the institutions in which such clinical trials are being conducted, the Data Monitoring Committee for such clinical trial, or by the FDA or other regulatory authorities due to a number of factors, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or clinical trial site by the FDA or other regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues or adverse side effects, failure to demonstrate a benefit from using a product candidate, changes in

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governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial. If we experience termination of, or delays in the completion of, any clinical trial of our product candidates, the commercial prospects for our product candidates will be harmed, and our ability to generate product revenue will be delayed. In addition, any delays in completing our clinical trials will increase our costs, slow down our product development and approval process and jeopardize our ability to commence product sales and generate revenue.

Many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may ultimately lead to the denial of regulatory approval of our product candidates.

Obtaining and maintaining regulatory approval of our product candidates in one jurisdiction does not mean that we will be successful in obtaining regulatory approval of our product candidates in other jurisdictions.

Obtaining and maintaining regulatory approval of our product candidates in one jurisdiction does not guarantee that we will be able to obtain or maintain regulatory approval in any other jurisdiction, while a failure or delay in obtaining regulatory approval in one jurisdiction may have a negative effect on the regulatory approval process in others. Approval procedures vary among jurisdictions and can involve requirements and administrative review periods different from, and greater than, those in the EU or U.S., including additional preclinical studies or clinical trials. Studies and clinical trials conducted in one jurisdiction may not be accepted by regulatory authorities in other jurisdictions.

We may also submit marketing applications in other countries. Regulatory authorities in jurisdictions outside of the EU and U.S. have requirements for approval of product candidates with which we must comply prior to marketing in those jurisdictions. Obtaining foreign regulatory approvals and compliance with foreign regulatory requirements could result in significant delays, difficulties and costs for us and could delay or prevent the introduction of our products in certain countries. If we fail to comply with the regulatory requirements in international markets and/or receive applicable marketing approvals, our target market will be reduced and our ability to realize the full market potential of our product candidates will be harmed.

Even if we receive regulatory approval of our product candidates, we will be subject to ongoing regulatory obligations and continued regulatory review, which may result in significant additional expense and we may be subject to penalties and/or withdrawal of product approval if we fail to comply with regulatory requirements or experience unanticipated problems with our product candidates.

Any regulatory approvals that we receive for our product candidates will require surveillance to monitor the safety and efficacy of the product candidate. The EMA and FDA may also require a Risk Evaluation and Mitigation Strategy, or REMS, in order to approve our product candidates, which could entail requirements for a medication guide, physician communication plans or additional elements to ensure safe use, such as restricted distribution methods, patient registries and other risk minimization tools. In addition, if the EMA, FDA or a comparable foreign regulatory authority approves our product candidates, the manufacturing processes, labeling, packaging, distribution, adverse event reporting, storage, advertising, promotion, import, export and recordkeeping for our product candidates will be subject to extensive and ongoing regulatory requirements. These requirements include, among other things, submissions of safety and other post-marketing information and reports, registration, as well as continued compliance with cGMPs and cGCPs for any clinical trials that we conduct post-approval. Later discovery of previously unknown problems with our product candidates, 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 our product candidates, withdrawal of the product from the market, or voluntary or mandatory product recalls;
- fines, warning letters or holds on clinical trials;
- refusal by the EMA or FDA to approve pending applications or supplements to approved applications filed by us or suspension or revocation of license approvals;
- suspension or termination of manufacturing at one or more manufacturing facilities;
- product seizure or detention, or refusal to permit the import or export of our product candidates; and
- injunctions or the imposition of civil or criminal penalties.

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The EMA's, FDA's and other regulatory authorities' policies may change, and additional government regulations may be enacted that could prevent, limit or delay regulatory approval of our product candidates. We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative action, either in Europe, the U.S. or abroad. 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, and we may not achieve or sustain profitability.

Foreign legislative changes may also affect our ability to commercialize our product candidates. Effective as of May 25, 2018, the GDPR imposes privacy and security obligations on any entity that collects and/or processes personal information from individuals located in the European Union. Under the GDPR, fines of up to 20 million euros or up to 4% of the annual global turnover of the infringer, whichever is greater, could be imposed for significant non-compliance.

Even if we obtain regulatory approval of our product candidates, the products may not gain market acceptance among physicians, patients, hospitals, cancer treatment centers, third-party payors and others in the medical community.

The use of engineered T cells as a potential cancer treatment is a recent development and may not become broadly accepted by physicians, patients, hospitals, cancer treatment centers, third-party payors and others in the medical community. We expect physicians in the large bone marrow transplant centers to be particularly influential and we may not be able to convince them to use our product candidates for many reasons. Many factors will influence whether our product candidates are accepted in the market, including:

- the clinical indications for which our product candidates are approved;
- physicians, hospitals, cancer treatment centers and patients considering our product candidates as a safe and effective treatment;
- the potential and perceived advantages of our product candidates over alternative treatments;
- the prevalence and severity of any side effects;
- product labeling or product insert requirements of the EMA, FDA or other regulatory authorities;
- limitations or warnings contained in the labeling approved by the EMA, FDA or other regulatory authorities;
- the extent and quality of the clinical evidence supporting the efficacy and safety of our product candidates;
- the timing of market introduction of our product candidates as well as competitive products;
- the cost of treatment in relation to alternative treatments;
- the availability of adequate reimbursement and pricing by third-party payors and government authorities;
- the willingness and ability of patients to pay out-of-pocket in the absence of coverage by third-party payors, including government authorities;
- relative convenience and ease of administration, including as compared to alternative treatments and competitive therapies;
- confusion or lack of understanding regarding the effects of rimiducid and the timing and size of dosing of rimiducid after immune cell therapy; and
- the effectiveness of our sales and marketing efforts.

In addition, although we are not utilizing embryonic stem cells or replication competent vectors, adverse publicity due to the ethical and social controversies surrounding the therapeutic use of such technologies, and reported side effects from any clinical trials using these technologies or the failure of such clinical trials to demonstrate that these therapies are safe and effective may limit market acceptance our product candidates. If our product candidates are approved but fail to achieve market acceptance among physicians, patients, hospitals, cancer treatment centers or others in the medical community, we will not be able to generate significant revenue.

Even if our products achieve market acceptance, we may not be able to maintain that market acceptance over time if new products or technologies are introduced that are more favorably received than our products, are more cost effective or render our products obsolete.

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Coverage and reimbursement may be limited or unavailable in certain market segments for our product candidates, which could make it difficult for us to sell our product candidates profitably.

Market acceptance and sales of our product candidates will depend in large part on global reimbursement policies and may be affected by future healthcare reform measures, both in the United States and other key international markets. Patients who are prescribed medicine for the treatment of their conditions generally rely on third-party payors to reimburse all or part of the costs associated with their prescription drugs. Patients are unlikely to use our products unless coverage is provided and reimbursement is adequate to cover a significant portion of the cost of our products. Therefore, successful commercialization of our products will depend in part on the availability of governmental and third-party payor reimbursement for the cost of our product candidates and/or payment to the physician for administering our product candidates. In the United States, no uniform policy of coverage and reimbursement for drug products exists among third-party payors. Therefore, coverage and reimbursement for drug products can differ significantly from payor to payor. As a result, the coverage determination process is often a time-consuming and costly process that will require us to provide scientific and clinical support for the use of our products to each payor separately, with no assurance that coverage and adequate reimbursement will be obtained. One third-party payor's decision to cover a particular medical product or service does not assure that other payors will also provide coverage for the medical product or service, or to provide coverage at an adequate reimbursement rate. As a result, the coverage determination process will require us to provide scientific and clinical support for the use of our products to each payor separately, with no assurance that adequate coverage and reimbursement will be obtained. Further, a third-party payor's decision to provide coverage for a medical product or service does not imply that an adequate reimbursement rate will be approved. The market for our product candidates will depend significantly on access to third-party payors' formularies or lists of treatments for which third-party payors provide coverage and reimbursement. Third party payors may also have difficulty in determining the appropriate coverage of our product candidates, if approved, including rivo-cel, due to the fact that they are combination products that include a small molecule drug, rimiducid. Third-party payors establish coverage and reimbursement policies for new products, including product candidates like rivo-cel and our other product candidates. In particular, in the United States, private health insurers and other third-party payors often provide reimbursement for treatments based on the level at which the government (through the Medicare or Medicaid programs) provides reimbursement for such treatments. In the United States, the EEA and other significant or potentially significant markets for our product candidate, government authorities and third-party payors are increasingly attempting to limit or regulate the price of medical products and services, particularly for new and innovative products and therapies, which has resulted in lower average selling prices. Further, the increased emphasis on managed healthcare in the United States and on country and regional pricing and reimbursement controls in Canada and the EEA will put additional pressure on product pricing, coverage, reimbursement and utilization, which may adversely affect our product sales and results of operations. These pressures can arise from policies and practices of managed care groups, judicial decisions and governmental laws and regulations related to Medicare, Medicaid and healthcare reform, coverage and reimbursement policies and pricing in general. Any reduction in reimbursement from Medicare or other government programs may result in a similar reduction in payments from private payors.

In March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or collectively, the PPACA, became law in the United States. PPACA substantially changes the way healthcare is financed by both governmental and private insurers and significantly affects the pharmaceutical industry. Among the provisions of the PPACA of greatest importance to the pharmaceutical industry are the following: (i) an annual, nondeductible fee on any entity that manufactures or imports certain branded prescription drugs and biologic agents, apportioned among these entities according to their market share in certain government healthcare programs; (ii) an increase in the rebates a manufacturer must pay under the Medicaid Drug Rebate Program to 23.1% and 13% of the average manufacturer price for branded and generic drugs, respectively; (iii) a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% point-of-sale discounts to 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; (iv) extension of manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations;

(v) expansion of eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to additional individuals with income at or below 133% of the Federal Poverty Level, thereby potentially increasing manufacturers' Medicaid rebate liability; (vi) expansion of the entities eligible for discounts under the Public Health Service pharmaceutical pricing program; (vii) expansion of health care fraud and abuse laws, including the federal civil False Claims Act and the Anti-Kickback Statute, new government investigative powers, and enhanced penalties for noncompliance; and (viii) a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research.

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Since its enactment there have been judicial and Congressional challenges to other aspects of the PPACA, as well as recent efforts by the Trump administration to repeal or replace certain aspects of the PPACA. Since January 2017, President Trump has signed two Executive Orders designed to delay the implementation of certain provisions of the PPACA or otherwise circumvent some of the requirements for health insurance mandated by the PPACA. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the PPACA. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the PPACA have been signed into law. The Tax Cuts and Jobs Act of 2017 includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the PPACA 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 PPACA-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. Congress may consider other legislation to replace elements of the PPACA. We continue to evaluate the potential effect of the possible repeal and replacement of the PPACA may have on our business.

In addition, other legislative changes have been proposed and adopted in the United States since the PPACA. For example, through the process created by the Budget Control Act of 2011, there are automatic reductions of Medicare payments to providers up to 2% per fiscal year, which went into effect in April 2013 and, following passage of the Bipartisan Budget Act of 2015, will remain in effect through 2025 unless additional Congressional action is taken. In January 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, which, among other things, further reduced Medicare payments to several providers.

Further, recently there has been heightened governmental scrutiny in the United States over the manner in which drug manufacturers set prices for their marketed products, in light of the rising cost of prescription drugs and biologics. Such scrutiny has resulted in several recent congressional inquiries and proposed federal 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 products. At the state level, legislatures are increasingly passing legislation and implementing 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, and, in some cases, designed to encourage importation from other countries and bulk purchasing. We expect that additional federal and state healthcare reform measures will be adopted in the future, any of which could result in reduced demand for our products or other adverse effects on our business.

In the EU, the success of rivo-cel and our other product candidates, if approved, will depend largely on obtaining and maintaining government reimbursement, because in many European countries patients are unlikely to use therapies that are not reimbursed by the government. Negotiating prices with governmental authorities can delay commercialization by 12 months or more. Reimbursement policies may adversely affect our ability to sell our products on a profitable basis. In many international markets, governments control the prices of prescription pharmaceuticals, including through the implementation of reference pricing, price cuts, rebates, revenue-related taxes and profit control, and expect prices of prescription pharmaceuticals to decline over the life of the product or as volumes increase. Recently, many countries in the EEA have increased the amount of discounts required on pharmaceutical products and other therapies, and we expect these discounts to continue as countries attempt to manage healthcare expenditures, especially in light of current economic conditions. As a result of these pricing practices, it may become difficult to achieve profitability or expected rates of growth in revenue or results of operations. Any shortfalls in revenue could adversely affect our business, prospects, financial condition and results of operations.

Certain countries have a very difficult reimbursement environment and we may not obtain reimbursement or pricing approval, if required, in all countries where we expect to market a product, or we may obtain reimbursement approval at a level that would make marketing a product in certain countries not viable.

We expect to experience pricing pressures in connection with the sale of rivo-cel and rimiducid, if approved, and any other products that we may develop, due to the trend toward managed healthcare, the increasing influence of health maintenance organizations and additional legislative proposals. If we fail to successfully secure and maintain adequate coverage and reimbursement for our products or are significantly delayed in doing so, we will have difficulty achieving market acceptance of our products and expected revenue and profitability which would have a material adverse effect on our business, prospects, financial condition and results of operations.

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Due to the novel nature of our technology and the small size of our target patient populations, we face uncertainty related to pricing and reimbursement for these product candidates.

Our target patient populations for rivo-cel and our other potential product candidates are relatively small, as a result, the pricing and reimbursement of our product candidates, if approved, must be adequate to support commercial and manufacturing infrastructure. If we are unable to obtain adequate levels of reimbursement, our ability to successfully market and sell our product candidates will be adversely affected. The manner and level at which reimbursement is provided for services related to our product candidates, for example, reimbursement for administration of our product candidates to patients, is also important. Inadequate reimbursement for such services may lead to physician resistance and adversely affect our ability to market or sell our products.

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

Among other matters, Trade Laws prohibit 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 engage third parties for clinical trials and/or to obtain necessary permits, licenses, patent registrations, and other regulatory approvals. We also expect our non-U.S. activities to increase in time. 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.

We are subject to extensive laws and regulations related to data privacy, and our failure to comply with these laws and regulations could harm our business.

We are subject to laws and regulations governing data privacy and the protection of personal information. These laws and regulations govern our processing of personal data, including the collection, access, use, analysis, modification, storage, transfer, security breach notification, destruction and disposal of personal data. There are foreign and state law versions of these laws and regulations to which we are currently and/or may in the future, be subject. For example, the collection and use of personal health data in the European Union is governed by the GDPR. The GDPR, which is wide-ranging in scope, imposes several requirements relating to the consent of the individuals to whom the personal data relates, the information provided to the individuals, the security and confidentiality of the personal data, data breach notification and the use of third party processors in connection with the processing of personal data. The GDPR also imposes strict rules on the transfer of personal data out of the European Union to the United States, provides an enforcement authority and imposes large monetary penalties for noncompliance. The GDPR requirements apply not only to third-party transactions, but also to transfers of information within our company, including employee information. The GDPR and similar data privacy laws of other jurisdictions place significant responsibilities on us and create potential liability in relation to personal data that we or our third party service providers process, including in clinical trials conducted in the United States and European Union. In addition, we expect that there will continue to be new proposed laws, regulations and industry standards relating to privacy and data protection in the United States, the European Union and other jurisdictions, and we cannot determine the impact such future laws, regulations and standards may have on our business.

Additionally, California recently enacted legislation that has been dubbed the first “GDPR-like” law in the United States. Known as the California Consumer Privacy Act, or CCPA, it creates new individual privacy rights for consumers (as that word is broadly defined in the law) and places increased privacy and security obligations on entities handling personal data of consumers or households. When it becomes effective on January 1, 2020, the CCPA will require covered companies to provide new disclosures to California consumers, provide such consumers new ways to opt-out of certain sales of personal information, and allow for a new cause of action for data breaches. Legislators have stated that amendments will be proposed to the CCPA before it goes into effect, but it remains

unclear what, if any, modifications will be made to this legislation or how it will be interpreted. As currently written, the CCPA will likely impact (possibly significantly) our business activities and exemplifies the vulnerability of our business to not only cyber threats but also the evolving regulatory environment related to personal data and protected health information.

We are subject to U.S. and certain foreign export and import controls, sanctions, embargoes, anti-corruption laws, and anti-money laundering laws and regulations. Compliance with these legal standards could impair our ability to compete in domestic and international markets. We can face criminal liability and other serious consequences for violations, which can harm our business.

We are subject to export control and import laws and regulations, including the U.S. Export Administration Regulations, U.S. Customs regulations, various economic and trade sanctions regulations administered by the U.S. Treasury Department's Office of

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Foreign Assets Controls, the U.S. Foreign Corrupt Practices Act of 1977, as amended, or FCPA, the U.S. domestic bribery statute contained in 18 U.S.C. § 201, the U.S. Travel Act, the USA PATRIOT Act, and other state and national anti-bribery and anti-money laundering laws in the countries in which we conduct activities. Anti-corruption laws are interpreted broadly and prohibit companies and their employees, agents, contractors, and other collaborators from authorizing, promising, offering, or providing, directly or indirectly, improper payments or anything else of value to recipients in the public or private sector. We may engage third parties for clinical trials outside of the United States, to sell our products abroad once we enter a commercialization phase, and/or to obtain necessary permits, licenses, patent registrations, and other regulatory approvals. We have direct or indirect interactions with officials and employees of government agencies or government-affiliated hospitals, universities, and other organizations. We can be held liable for the corrupt or other illegal activities of our employees, agents, contractors, and other collaborators, even if we do not explicitly authorize or have actual knowledge of such activities. Any violations of the laws and regulations described above may result in substantial civil and criminal fines and penalties, imprisonment, the loss of export or import privileges, debarment, tax reassessments, breach of contract and fraud litigation, reputational harm, and other consequences.

Changes in funding for the FDA, the SEC and other government agencies could hinder their ability to hire and retain key leadership and other personnel, prevent new products from being developed or commercialized in a timely manner or otherwise prevent those agencies from performing normal functions on which the operation of our business may rely, which could negatively impact our business.

The ability of the FDA to review and approve new products can be affected by a variety of factors, including government budget and funding levels, ability to hire and retain key personnel and accept payment of user fees, and statutory, regulatory, and policy changes. Average review times at the agency have fluctuated in recent years as a result. In addition, government funding of the SEC and other government agencies on which our operations may rely, including those that fund research and development activities is subject to the political process, which is inherently fluid and unpredictable.

Disruptions at the FDA and other agencies may also slow the time necessary for new drugs to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years, including beginning on December 22, 2018 and ending on January 25, 2019, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA and the SEC, have had to furlough critical FDA, SEC and other government employees and stop critical activities. If repeated or prolonged government shutdowns occur, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business. Further, future government shutdowns could impact our ability to access the public markets and obtain necessary capital in order to properly capitalize and continue our operations.

Risks Related to Our Intellectual Property

We depend on intellectual property licensed from third parties and termination of any of these licenses could result in the loss of significant rights, which would harm our business.

We are dependent on patents, know-how and proprietary technology, both our own and licensed from others. We license from Baylor College of Medicine, or Baylor, certain intellectual property related to methods for activating antigen presenting cells, to certain genetic constructs and to certain methods for inducing apoptosis. Baylor may terminate or modify our licenses in the event of a material breach by us that remains uncured following the date that is 90 days after written notice of such breach or upon certain insolvency events that remain uncured following the date that is 30 days following written notice of such insolvency event. In addition, we have funded certain of our ongoing clinical development and will fund certain of our future clinical development with funds from the State of Texas. The State of Texas may have rights to commercialize the results of those clinical trials if it determines that we have failed, after notice and an opportunity to cure, to use diligent and commercially reasonable efforts to commercialize or otherwise bring to practical application the results of the funded clinical trials. We are also dependent on our license agreements with Agensys, Inc. (a subsidiary of Astellas Pharma, Inc.) with respect to PSCA-targeted CARs, Leiden University with respect to certain TCRs and BioVec Pharma Inc. with respect to making retrovirus for all of our programs. The termination of any of these licenses could have a material adverse effect on our business.

Any termination of these agreements, or other agreements to which we are a party could result in the loss of significant rights and could harm our ability to commercialize our product candidates. See “Item 1. Business—Our License Agreements” for additional information regarding our license agreements.

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Disputes may also arise between us and our licensors and other partners regarding intellectual property subject to a license agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- whether and the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- our right to sublicense patent and other rights to third parties under collaborative development relationships;
- our diligence obligations with respect to the use of the licensed technology in relation to our development and commercialization of our product candidates, and what activities satisfy those diligence obligations; and
- 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.

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. If we or our licensors fail to adequately protect this intellectual property, our ability to commercialize products could suffer.

If our efforts to protect the proprietary nature of our technologies are not adequate, we may not be able to compete effectively in our market.

Any disclosure to or misappropriation by third parties of our confidential proprietary information could enable competitors to quickly duplicate or surpass our technological achievements, thus eroding our competitive position in our market. Certain intellectual property which is covered by our in-license agreements has been developed at academic institutions which have retained non-commercial rights to such intellectual property.

There are several pending U.S. and foreign patent applications in our portfolio, and we anticipate additional patent applications will be filed both in the U.S. and in other countries, as appropriate. However, we cannot predict:

- if and when patents will issue;
- the degree and range of protection any issued patents will afford us against competitors including whether third parties will find ways to invalidate or otherwise circumvent our patents;
- whether or not others will obtain patents claiming aspects similar to those covered by our patents and patent applications; or
- whether we will need to initiate litigation or administrative proceedings which may be costly whether we win or lose.

Composition of matter patents for biological and pharmaceutical products are generally considered to be the strongest form of intellectual property. We cannot be certain that the claims in our pending patent applications directed to compositions of matter for our product candidates will be considered patentable by the U.S. Patent and Trademark Office, or the USPTO, or by patent offices in foreign countries, or that the claims in any of our issued patents will be considered valid by courts in the U.S. or foreign countries. Method of use patents have claims directed to 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.

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The strength of patents in the biotechnology and pharmaceutical field involves complex legal and scientific questions and can be uncertain. The patent applications that we own or in-license may fail to result in issued patents with claims that cover our product candidates or uses thereof in the U.S. or in other foreign countries. Even if the patents do successfully issue, 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. Further, if we encounter delays in our clinical trials, the period of time during which we could market our product candidates under patent protection would be reduced. Since patent applications in the U.S. and most other countries are confidential for a period of time after filing, it is possible that patent applications in our portfolio may not be the first filed patent applications related to our product candidates. Furthermore, for U.S. applications in which all claims are entitled to a priority date before March 16, 2013, an interference proceeding can be provoked by a third-party or instituted by the USPTO, to determine who was the first to invent any of the subject matter covered by the patent claims of our applications. For U.S. applications containing a claim not entitled to priority before March 16, 2013, there is a greater level of uncertainty in the patent law with the passage of the America Invents Act (2012) which brings into effect significant changes to the U.S. patent laws that are yet untried and untested, and which introduces new procedures for challenging pending patent applications and issued patents. A primary change under this reform is creating a “first to file” system in the U.S. This will require us to be cognizant going forward of the time from invention to filing of a patent application.

Patent coverage on the dimerization molecule rimiducid, expired in February 2016. Therefore, any additional barriers to entry for competitors to use rimiducid may not be effective in preventing such use. There remain significant questions regarding how the FDA will interpret the ‘biosimilar’ provisions recently added to the PHSA as applied to complex biological products such as our investigational products. Depending on how the FDA ultimately interprets these provisions, if our investigational products incorporating rimiducid receive FDA approval through a combination product BLA, then a biosimilar of these combination products could be approved by the FDA twelve years from the date that we receive FDA approval for our application. In addition, if a third party were able to obtain FDA approval of a new drug application for rimiducid on its own, then it is possible that other third parties could later seek approval of an abbreviated new drug application for rimiducid.

We rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable, processes for which patents are difficult to enforce and any other elements of our product discovery and development processes that involve proprietary know-how, information, or technology that is not covered by patents. We require all of our employees to assign their inventions to us, and require all of our employees, consultants, advisors and any third parties who have access to our proprietary know-how, information, or technology to enter into confidentiality agreements; however, it is possible that our trade secrets and other confidential proprietary information could be disclosed or that competitors may otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. Furthermore, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the U.S. As a result, we may encounter significant problems in protecting and defending our intellectual property both in the U.S. and abroad. If we are unable to prevent unauthorized material disclosure of our intellectual property to third parties, we will not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business, operating results and financial condition.

Third-party claims of intellectual property infringement may prevent or delay our product discovery and development efforts.

Our commercial success depends in part on our avoiding infringement of the patents and proprietary rights of third parties. There is a substantial amount of litigation involving patents and other intellectual property rights in the biotechnology and pharmaceutical industries, as well as administrative proceedings for challenging patents, including interference and reexamination proceedings before the USPTO or oppositions and other comparable proceedings in foreign jurisdictions. Recently, under U.S. patent reform, new procedures including inter parties review and post grant

review have been implemented. As stated above, this reform is untried and untested and will bring uncertainty to the possibility of challenge to our patents in the future. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are developing our product candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates may give rise to claims of infringement of the patent rights of others.

Third parties may assert that we are employing their proprietary technology without authorization. There may be third-party patents, of which we are currently unaware or have not sufficiently analyzed with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that our product candidates may infringe. In addition, third parties may obtain patents in the future and claim that use of our technologies infringes upon these patents. If any third-party patents were held by a court of competent jurisdiction to cover aspects of our formulations, the manufacturing process of our product candidates, constructs or molecules used in or formed during the manufacturing process, methods of use,

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including combination therapy or patient selection methods or any final product itself, the holders of any such patents may be able to block our ability to develop and commercialize the product candidate unless we obtained a license under the applicable patents, or until such patents expire or they are finally determined to be held invalid or unenforceable. In either case, such a license may not be available on commercially reasonable terms or at all. If we are unable to obtain a necessary license to a third-party patent on commercially reasonable terms, or at all, our ability to commercialize our product candidates may be impaired or delayed, which could in turn significantly harm our business.

Parties making claims against us may seek and obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize our product candidates. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. In the event of a successful claim of infringement against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, obtain one or more licenses from third parties, pay royalties or redesign our infringing products, which may be impossible or require substantial time and monetary expenditure. It is possible that any such license would not be available at all or on commercially reasonable terms. Furthermore, even in the absence of litigation, we may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, if at all. In that event, we would be unable to further develop and commercialize our product candidates, which could harm our business significantly.

For example, we are aware of a third-party patent having claims directed to chimeric DNA comprising DNA segments encoding (1) a single chain antibody domain and (2) transmembrane and cytoplasmic domains of an endogenous protein. Even though we have reason to believe that our product candidates are not covered by claims of this patent, an owner or licensee of the patent still might bring a patent infringement suit against us. If the patent is asserted against us, we may not prevail in defending against claims of infringement and/or challenging the validity of claims in the patent. We may not successfully develop alternative technologies or enter into an agreement by which we obtain rights to the patent. These rights, if necessary, may not be available on terms acceptable to us.

We are aware of third-party patents having claims that may be considered as being directed to single-chain antibody fragments that bind to PSCA and these patents may be considered relevant to BPX-601 and related technologies we are developing. We currently are evaluating whether or not we need to obtain rights to these patents under a license, and if it is determined that we need to obtain such rights, whether these rights can be obtained. We are also aware of third-party patent applications having claims that may be considered as being directed to cellular therapy constructs utilizing a heterodimer domain for activation of iC9. We are monitoring these applications and if they are granted with the claims as drafted they may be relevant to our potential dual-switch product candidates containing such a heterodimer activation domain.

Also, while we are aware there are other third-party patents having claims that may be considered relevant to technologies for which we are seeking, or plan to seek, regulatory approval, we believe those patents have a patent term that may expire prior to the time we expect to obtain regulatory approval for these technologies. The estimated expiration dates for those patents were determined according to information on the face pages of the patents, and certain factors that could influence patent term, such as patent term adjustment and patent term extension, for example, were not factored into these estimates. Accordingly, the estimated expiration dates of those patents may not be accurate and one or more of those patents may not expire before we obtain regulatory approval for an applicable technology. Owners or licensees of one or more of those patents may bring a patent infringement suit against us. If one or more of those patents are asserted against us, we may be able to assert a defense for a safe harbor to patent infringement under 35 U.S.C. 271(e)(1) if certain requirements are met. It is possible that (1) certain of these requirements may not be met, and/or (2) one or more of the third-party patents might expire after one or more of our technologies obtain regulatory approval, and consequently we may not successfully assert such a defense to patent infringement. If we are unsuccessful in asserting a defense under 35 U.S.C. 271(e)(1), it is possible we may not prevail in defending against claims of infringement and/or challenging the validity of claims in those patents. We may not successfully develop alternative technologies or enter into agreements by which we obtain rights to applicable patents. These rights, if necessary, may not be available on terms acceptable to us.

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

Because our programs may involve additional product candidates that may require the use of proprietary rights held by third parties, the growth of our business will likely depend in part on our ability to acquire, in-license or use these proprietary rights.

Our product candidates may also require specific formulations to work effectively and efficiently and these rights may be held by others. We may be unable to acquire or in-license any compositions, methods of use, processes or other third-party intellectual property rights from third parties that we identify. 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.

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The licensing and acquisition of third-party intellectual property rights is a competitive area, and companies, which may be more established, or have greater resources than we do, may also be pursuing strategies to license or acquire third-party intellectual property rights that we may consider necessary or attractive in order to commercialize our product candidates. More established companies may have a competitive advantage over us due to their size, cash resources and greater clinical development and commercialization capabilities.

We may not be able to successfully complete negotiations and ultimately acquire the rights to the intellectual property that we may seek to acquire in the future.

We may be involved in lawsuits or other proceedings to protect or enforce our patents or the patents of our licensors, which could be expensive, time-consuming and unsuccessful.

Competitors may infringe our patents or the patents of our licensors. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that one or more of our patents is not valid or is unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation or defense proceedings could put one or more of our patents at risk of being invalidated, held unenforceable, or interpreted narrowly and could put our patent applications at risk of not issuing. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. It also is possible that a competitor we sue for patent infringement could countersue us for allegedly infringing one or more of their own patents or one or more patents they licensed from another entity. In the event of a successful claim of infringement against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, obtain one or more licenses from third parties, pay royalties or redesign our infringing products, which may be impossible or require substantial time and monetary expenditure.

Interference proceedings provoked by third parties or brought by the USPTO may be necessary to determine the priority of inventions with respect to our patents or patent applications or those of our licensors. An unfavorable outcome could result in a loss of our patent rights and could require us to cease using the related technology or to attempt to license rights to it from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license on commercially reasonable terms. It also is possible that third parties could institute a patent office post-grant proceeding against one or more of our patents, or one or more patents licensed to us, such as a post grant review proceeding, inter parties review proceeding or reexamination proceeding at the USPTO, or an opposition proceeding in a jurisdiction outside the U.S. An unfavorable outcome in a post-grant proceeding could result in a loss of our patent rights. Litigation, interference proceedings or patent office post-grant proceedings may result in a decision adverse to our interests and, even if we are successful, may result in substantial costs and distract our management and other employees. We also may not be able to prevent, alone or with our licensors, misappropriation of our trade secrets or confidential information, particularly in countries where the laws may not protect those rights as fully as in the U.S.

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 this type of litigation. In addition, there could 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 substantial adverse effect on the price of our common stock.

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

Periodic maintenance fees on any issued patent are due to be paid to the USPTO and foreign patent agencies in several stages over the lifetime of the patent. The USPTO and various foreign governmental patent agencies 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. Noncompliance 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. Such noncompliance events are outside of our direct control for (1) non-U.S. patents and patent applications owned by us, and (2) patents and patent applications licensed to us by another entity. In such an event, our competitors might be able to enter the market, which would have a material adverse effect on our business.

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Issued patents covering our product candidates could be found invalid or unenforceable if challenged in court or the USPTO.

If we or one of our licensing partners initiate legal proceedings against a third party to enforce a patent covering one of our product candidates, the defendant could counterclaim that the patent covering our product candidate, as applicable, is invalid and/or unenforceable. In patent litigation in the U.S., defendant counterclaims alleging invalidity and/or unenforceability are commonplace, and there are numerous grounds upon which a third party can assert invalidity or unenforceability of a patent. Third parties may also raise similar claims before administrative bodies in the U.S. or abroad, even outside the context of litigation. Such mechanisms include re-examination, post grant review, and equivalent proceedings in foreign jurisdictions, for example, opposition proceedings. Any such proceedings could result in revocation or amendment to our patents in such a way that they no longer cover our product candidates. The outcome following legal assertions of invalidity and unenforceability is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art and that prior art that was cited during prosecution, but not relied on by the patent examiner, will not be revisited. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the patents directed to our product candidates. A loss of patent rights could have a material adverse impact on our business.

Changes in U.S. patent law could diminish the value of patents in general, thereby impairing our ability to protect our products.

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 involve both technological and legal complexity, and is therefore costly, time-consuming and inherently uncertain. In addition, the U.S. has recently enacted and is currently implementing wide-ranging patent reform legislation. Recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the U.S. Congress, the federal courts, and the USPTO, 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 recent 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.

We have limited foreign intellectual property rights and may not be able to protect our intellectual property rights throughout the world.

We have limited intellectual property rights outside the U.S. Filing, prosecuting and defending patents on product candidates in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the U.S. can be less extensive than those in the U.S. In addition, the laws of some foreign countries do not protect intellectual property to the same extent as federal and state laws in the U.S. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the U.S., or from selling or importing products made using our inventions in and into the U.S. or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patents to develop their own products and further, may export otherwise infringing products to territories where we have patents, but enforcement is not as strong as that in the U.S. 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.

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Many companies have encountered significant problems in protecting and defending intellectual property in foreign jurisdictions. The legal systems of certain countries, particularly China and certain other developing countries, do not favor the enforcement of patents, trade secrets and other intellectual property, particularly those relating to biopharmaceutical products, 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. To date, we have not sought to enforce any issued patents in these foreign jurisdictions. 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 lawsuits that we initiate, and the damages or other remedies awarded, if any, may not be commercially meaningful. The requirements for patentability may differ in certain countries, particularly developing countries. Furthermore, generic drug manufacturers or other competitors may challenge the scope, validity or enforceability of our or our licensors' patents, requiring us or our licensors to engage in complex, lengthy and costly litigation or other proceedings. Certain countries in Europe and 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. 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.

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

We have received confidential and proprietary information from third parties. In addition, we employ individuals who were previously employed at other biotechnology or pharmaceutical companies. We may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise used or disclosed confidential information of these third parties or our employees' former employers. Litigation may be necessary to defend against these claims. Even if we are successful in defending against these claims, litigation could result in substantial cost and be a distraction to our management and employees.

Risks Related to Ownership of our Common Stock

We are subject to securities litigation, which is expensive and could divert management attention.

Our share price has been and may continue to be volatile. Companies that have experienced volatility in the market price of their stock have been subject to securities class action litigation. We are a target of this type of litigation. For example, on February 6, 2018, a purported securities class action complaint captioned Nipun Kakkar v. Bellicum Pharmaceuticals, Inc., Rick Fair and Alan Musso was filed against us, and certain of our officers in the U.S. District Court for the Southern District of Texas, Houston Division. A second substantially similar class action was filed on March 14, 2018 by plaintiff Frances Rudy against the same defendants in the same court. The lawsuits purport to assert class action claims on behalf of purchasers of our securities during the period from May 8, 2017 through January 30, 2018. The complaints allege that the defendants violated the Exchange Act by making materially false and misleading statements concerning our clinical trials being conducted in the U.S. to assess rivo-cel as an adjunct T-cell therapy administered after allogeneic hematopoietic stem cell transplantation. The complaints purport to assert claims for violations of Sections 10(b) and 20(a) of the Exchange Act and Rule 10b-5 promulgated thereunder. The complaints seek, on behalf of the purported class, an unspecified amount of monetary damages, interest, fees and expenses of attorneys and experts, and other relief. On April 9, 2018, the District Court consolidated the two lawsuits under the Kakkar action and motions were filed by putative class members for appointment as lead plaintiff and approval of lead counsel.

On July 19, 2018, a purported shareholder derivative complaint captioned Seung Paik v. Richard A. Fair, et al. was filed against the Company's directors and certain of the Company's officers in the U.S. District Court for the Southern District of Texas, Houston Division. The lawsuit purports to seek damages on behalf of the Company against the individual defendants for breach of fiduciary duty, waste, unjust enrichment and violations of Section 14(a) of the Exchange Act. The complaint alleges that the defendants caused or allowed the Company to disseminate

misstatements regarding the clinical trials for rivo-cel and to make false or misleading statements in the proxy materials for the Company's 2017 annual meeting of stockholders. On October 3, 2018, the District Court granted the Company's motion to stay the derivative cause of action until reinstated on motion of the parties.

The District Court conducted a status hearing on February 21, 2019 to hear arguments on competing motions from putative class members for appointment as lead plaintiff. The Court has yet to rule on the motions.

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Litigation of this type could result in substantial costs and diversion of management's attention and resources, which could adversely impact our business. Any adverse determination in litigation could also subject us to significant liabilities.

The price of our stock is volatile and you could lose all or part of your investment.

Prior to our December 2014 IPO, there was no public market for our common stock. The trading price of our common stock is likely to continue to be highly volatile and subject to wide fluctuations in response to various factors, some of which are beyond our control, including market conditions in general and a limited trading volume for our shares. In addition to the factors discussed in this "Risk Factors" section and elsewhere in our Annual Report, these factors include:

- the commencement, enrollment or results of the planned clinical trials of our product candidates or any future clinical trials we may conduct, or changes in the development status of our product candidates;
- any delay in our regulatory filings for our product candidates and any adverse development or perceived adverse development with respect to the applicable regulatory authority's review of such filings, including without limitation the FDA's issuance of a "refusal to file" letter or a request for additional information;
- adverse results or delays in our ongoing or future clinical trials, including for rivo-cel;
- our decision to initiate a clinical trial, not to initiate a clinical trial or to terminate an existing clinical trial;
- adverse regulatory decisions, including failure to receive regulatory approval of our product candidates;
- changes in laws or regulations applicable to our products, including but not limited to clinical trial requirements for approvals;
- adverse developments concerning our CID technology platform and our small molecule drug rimiducid;
- adverse developments concerning our manufacturers;
- our inability to obtain adequate product supply for any approved product or inability to do so at acceptable prices;
- our inability to maintain successful collaborations or to establish new collaborations if needed;
- our failure to commercialize our product candidates;
- additions or departures of key scientific or management personnel;
- unanticipated serious safety concerns related to the use of our product candidates;
- introduction of new products or services offered by us or our competitors;
- announcements of significant acquisitions, strategic partnerships, joint ventures or capital commitments by us or our competitors;
- our ability to effectively manage our growth;
- the size and growth of our initial target markets;
- our ability to successfully treat additional types of diseases and cancers or at different stages;
- actual or anticipated variations in quarterly operating results;
- our cash position;
- our failure to meet the estimates and projections of the investment community or that we may otherwise provide to the public;
- publication of research reports about us or our industry, or immunotherapy in particular, or positive or negative recommendations or withdrawal of research coverage by securities analysts;
- changes in the market valuations of similar companies;
- overall performance of the equity markets;
- sales of our common stock by us or our stockholders in the future;
- trading volume of our common stock;
- changes in accounting practices;
- ineffectiveness of our internal controls;

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- disputes or other developments relating to proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our technologies;
- significant lawsuits, including patent or stockholder litigation;
- general political and economic conditions; and
- other events or factors, many of which are beyond our control.

In addition, the stock market in general, and The Nasdaq Global Market and biopharmaceutical companies in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of these companies. Broad market and industry factors may negatively affect the market price of our common stock, regardless of our actual operating performance. In the past, securities class action litigation has often been instituted against companies following periods of volatility in the market price of a company's securities. This type of litigation, if instituted, could result in substantial costs and a diversion of management's attention and resources, which would harm our business, operating results or financial condition.

We do not intend to pay dividends on our common stock, so any returns will be limited to the value of our stock.

We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. In addition, the terms of our loan and security agreement with Oxford restrict our ability to declare or pay any cash dividend or make a cash distribution on any class of stock or other equity interest. Any return to stockholders will therefore be limited to the appreciation of their stock.

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

As of March 1, 2019, our executive officers, directors and 5% stockholders beneficially owned approximately 29.7% of our outstanding voting shares. Therefore, these stockholders may have the ability to significantly influence us through this ownership position. These stockholders may be able to significantly influence all matters requiring stockholder approval. For example, these stockholders may be able to significantly influence 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 feel are in your best interest as one of our stockholders.

We are an emerging growth company and a smaller reporting company and the reduced reporting requirements applicable to emerging growth companies and smaller reporting companies may make our common stock less attractive to investors.

We are an emerging growth company, as defined in the JOBS Act enacted in April 2012. For as long as we continue to be an emerging growth company, we may take advantage of exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies, including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended, or the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our Annual Report and our periodic reports and proxy statements and exemptions from the requirements of holding nonbinding advisory votes on executive compensation and stockholder approval of any golden parachute payments not previously approved. We could be an emerging growth company through 2019, although circumstances could cause us to lose that status earlier. We will remain an emerging growth company until the earlier of (a) December 31, 2019, (b) the last day of the fiscal year in which we have total annual gross revenue of at least $1.0 billion, (c) the last day of the fiscal year in which we are deemed to be a large accelerated filer, which requires the market value of our common stock that is held by non-affiliates to exceed $700.0 million as of the prior June 30th, or (d) the date on which we have issued more than $1.0 billion in non-convertible debt during the prior three-year period.

We expect to continue to take advantage of some, but not all, of the available exemptions. Even after we no longer qualify as an emerging growth company, we may still qualify as a smaller reporting company, or SRC, which would allow us to take advantage of many of the same exemptions from disclosure requirements, including reduced disclosure obligations regarding executive compensation. We will remain an SRC until (a) the aggregate market value of our outstanding common stock held by non-affiliates as of the last business day our most recently completed second fiscal quarter exceeds $250 million or (b) (1) we have over $100 million in annual revenues and (2) the

aggregate market value of our outstanding common stock held by non-affiliates as of the last business day our most recently completed second fiscal quarter exceeds $700 million. We cannot predict whether investors will find our common stock less attractive if we rely on certain or all of 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 and may decline.

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Under the JOBS Act, emerging growth companies can also delay adopting new or revised accounting standards until such time as those standards apply to private companies. We have irrevocably elected not to avail ourselves of this exemption from new or revised accounting standards and, therefore, will be subject to the same new or revised accounting standards as other public companies that are not emerging growth companies. As a result, changes in rules of U.S. generally accepted accounting principles, or US GAAP, or their interpretation, the adoption of new guidance or the application of existing guidance to changes in our business could significantly affect our financial position and results of operations.

Changes in accounting rules, assumptions and/or judgments could materially and adversely affect us.

Accounting rules and interpretations for certain aspects of our operations are highly complex and involve significant assumptions and judgment. These complexities could lead to a delay in the preparation and dissemination of our financial statements. Furthermore, changes in accounting rules and interpretations or in our accounting assumptions and/or judgments, such as asset impairments, could significantly impact our financial statements. In some cases, we could be required to apply a new or revised standard retroactively, resulting in restating prior period financial statements. Any of these circumstances could have a material adverse effect on our business, prospects, liquidity, financial condition and results of operations.

Sales of a substantial number of shares of our common stock by our existing stockholders in the public market could cause our stock price to fall.

Certain holders of our outstanding shares of common stock, are entitled to rights with respect to the registration of their shares under the Securities Act of 1933, as amended, or Securities Act. Any sales of these shares by such stockholders could have a material adverse effect on the trading price of our common stock.

We register on Form S-8 all shares of common stock that are issuable under our 2014 Equity Incentive Plan, as amended, or the EIP. As a consequence, these shares can be freely sold in the public market upon issuance, subject to volume limitations applicable to affiliates.

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

We expect that significant additional capital will be needed in the future to continue our planned operations, including conducting clinical trials, commercialization efforts for rivo-cel, expanded research and development activities and costs associated with operating a public company. To raise capital, 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, including pursuant to our shelf registration statement on Form S-3 that we filed with the SEC. In addition, on October 5, 2018, we entered into an Open Market Sale Agreement with Jefferies LLC, as sales agent, pursuant to which we may offer and sell, from time to time, shares of common stock with an aggregate offering price of up to $60.0 million. If we sell common stock, convertible securities or other equity securities, investors may be materially diluted by subsequent sales. Any such sales may also result in material dilution to our existing stockholders, and new investors could gain rights, preferences and privileges senior to the existing holders of our common stock.

Anti-takeover provisions under our charter documents and Delaware law could delay or prevent a change of control which could limit the market price of our common stock and may prevent or frustrate attempts by our stockholders to replace or remove our current management.

Our amended and restated certificate of incorporation and amended and restated bylaws contain provisions that could delay or prevent a change of control of our company or changes in our board of directors that our stockholders might consider favorable. Some of these provisions include:

- a board of directors divided into three classes serving staggered three-year terms, such that not all members of the board will be elected at one time;
- a prohibition on stockholder action through written consent, which requires that all stockholder actions be taken at a meeting of our stockholders;
- a requirement that special meetings of stockholders be called only by the chairman of the board of directors, the chief executive officer, or by a majority of the total number of authorized directors;

- advance notice requirements for stockholder proposals and nominations for election to our board of directors;

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- a requirement that no member of our board of directors may be removed from office by our stockholders except for cause and, in addition to any other vote required by law, upon the approval of not less than two-thirds of all outstanding shares of our voting stock then entitled to vote in the election of directors;
- a requirement of approval of not less than two-thirds of all outstanding shares of our voting stock to amend any bylaws by stockholder action or to amend specific provisions of our certificate of incorporation; and
- the authority of the board of directors to issue convertible preferred stock on terms determined by the board of directors without stockholder approval and which convertible preferred stock may include rights superior to the rights of the holders of common stock.

In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporate Law, which may prohibit certain business combinations with stockholders owning 15% or more of our outstanding voting stock. These anti-takeover provisions and other provisions in our amended and restated certificate of incorporation and amended and restated bylaws could make it more difficult for stockholders or potential acquirers to obtain control of our board of directors or initiate actions that are opposed by the then-current board of directors and could also delay or impede a merger, tender offer or proxy contest involving our company. These provisions could also discourage proxy contests and make it more difficult for you and other stockholders to elect directors of your choosing or cause us to take other corporate actions you desire. Any delay or prevention of a change of control transaction or changes in our board of directors could cause the market price of our common stock to decline.

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 depends in part on the research and reports that securities or industry analysts publish about us or our business. In the event securities or industry analysts that cover us downgrade our stock or publish inaccurate or unfavorable research about our business, our stock price may decline. If one or more of these analysts ceases coverage of us or fails to publish reports on us regularly, demand for our stock could decrease, which might cause our stock price and trading volume to decline.

Unfavorable global economic conditions could adversely affect our business, financial condition or results of operations.

A severe or prolonged economic downturn could result in a variety of risks to our business, including reduced ability to raise additional capital when needed on acceptable terms, if at all. A weak or declining economy could also strain our relationships with our contractors and potential collaboration partners. Any of the foregoing could harm our business and we cannot anticipate all of the ways in which the current economic climate and financial market conditions could adversely impact our business.

In addition, Brexit has and may continue to cause disruptions to capital and currency markets worldwide. The full impact of the Brexit decision remains uncertain. A process of negotiation will determine the future terms of the United Kingdom’s relationship with the European Union. During this period of negotiation, our results of operations and access to capital may be negatively affected by interest rate, exchange rate and other market and economic volatility, as well as regulatory and political uncertainty. Brexit may also have a detrimental effect on our customers, distributors and suppliers, which would, in turn, adversely affect our financial condition.

ITEM 1B. Unresolved Staff Comments

None.

ITEM 2. Properties

We lease an aggregate of approximately 65,608 square feet of space in Houston, Texas, which consists of a 35,251 square foot facility for administrative and research and development activities under a lease that expires in January 2020 with five, one-year lease renewal options, and a 30,357 square foot facility for in-house cell therapy manufacturing activities under a lease that expires in August 2026, with an option to renew for one additional period of five years. During 2016, the Company leased an aggregate of 3,540 additional square feet primarily for manufacturing and clean room space which is included in the manufacturing square footage above. We believe that

our existing facilities are adequate to meet our current needs, and that suitable additional alternative spaces will be available in the future on commercially reasonable terms.

ITEM 3. Legal Proceedings

On February 6, 2018, a purported securities class action complaint captioned Nipun Kakkar v. Bellicum Pharmaceuticals, Inc., Rick Fair and Alan Musso was filed against us, and certain of our officers in the U.S. District Court for the Southern District of Texas, Houston Division. A second substantially similar class action was filed on March 14, 2018 by plaintiff Frances Rudy against the same
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The District Court conducted a status hearing on February 21, 2019 to hear arguments on competing motions from putative class members for appointment as lead plaintiff. The Court has yet to rule on the motions.

ITEM 4. Mine Safety Disclosures

Not applicable.

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PART II

ITEM 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Market Information

Our common stock began trading on The Nasdaq Global Market on December 18, 2014 under the symbol "BLCM." Prior to such time, there was no public market for our common stock.

Holders of Record

As of March 1, 2019, there were approximately 17 stockholders of record of our common stock. Certain shares are held in "street" name and thus the actual number of beneficial owners of such shares is not known or included in the foregoing number.

Dividend Policy

We have never declared or paid any dividends on our common stock. In addition, the terms of our loan and security agreement with Oxford restrict our ability to declare or pay any cash dividend or make a cash distribution on any class of stock or other equity interest. We currently intend to retain all available funds and any future earnings to support our operations and finance the growth and development of our business and we do not anticipate paying any cash dividends in the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors and will depend upon, among other factors, our results of operations, financial condition, capital requirements, contractual restrictions, business prospects and other factors our board of directors may deem relevant.

Securities Authorized for Issuance under Equity Compensation Plans

Information about our equity compensation plans is incorporated herein by reference to Item 12 of Part III of this Annual Report.

Recent Sales of Unregistered Securities

None.

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ITEM 6. Selected Financial Data

As a smaller reporting company, we are not required to provide certain information typically disclosed under this item.

The following selected financial data should be read in conjunction with our audited financial statements and the notes thereto and "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" located elsewhere in this Annual Report. Amounts are in thousands, except share and per share data.

We derived the statements of operations data for the years ended December 31, 2018 and 2017 and the balance sheet data as of December 31, 2018 and 2017 from our audited financial statements included in this annual report. Our historical results for any prior period are not necessarily indicative of the results to be expected for any future period. You should read the notes to our financial statements for an explanation of the method used to determine the number of shares used in computing basic and diluted net loss per share.

	Year Ended December 31,	
	2018	2017
	(in thousands, except share and per share data)	
Statement of Operations:		
Grant revenues	$1,120	$185
Operating expenses:		
Research and development	71,152	65,663
License fees	436	864
General and administrative	24,998	21,045
Total operating expenses	96,586	87,572
Loss from operations	(95,466)	(87,387)
Interest income	1,639	1,055
Interest expense	(4,199)	(3,672)
Gain/(loss) on disposal of assets	(10)	11
Loss on extinguishment of debt	—	(1,786)
Net loss	$(98,036)	$(91,779)
Basic and diluted net loss per share	$(2.44)	$(2.89)
Weighted average common shares outstanding— basic and diluted	40,230,580	31,714,164

	As of December 31,	
	2018	2017
	(in thousands)	
Balance Sheet Data:		
Cash, cash equivalents, restricted cash and investment securities	$97,972	$106,454
Working capital	79,491	89,494
Total assets	121,501	135,528
Capital lease obligation, net of current portion	91	131
Long-term debt, net of current portion	35,832	34,946
Accumulated deficit	(420,548)	(322,512)
Total stockholders' equity	68,478	84,648

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ITEM 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

You should read the following discussion and analysis together with "Item 6. Selected Financial Data" and our financial statements and related notes included in "Item 8 - Financial Statements and Supplementary Data" in this Annual Report. The following discussion contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those expressed or implied in any forward-looking statements as a result of various factors, including those set forth under the caption "Item 1A. Risk Factors."

Overview

We are a clinical stage biopharmaceutical company focused on discovering and developing novel cellular immunotherapies by modulating T cell function via controllable molecular switches. We are focused on developing treatments for various forms of cancer, including both hematological cancers and solid tumors, as well as orphan inherited blood disorders. We are using our proprietary Chemical Induction of Dimerization, or CID, technology platform to engineer our product candidates with switch technologies that are designed to control components of the immune system in real time. By incorporating our CID platform, our product candidates may offer better efficacy and safety outcomes than are seen with current cellular immunotherapies. For additional information about our business, and candidate development programs, see the discussions contained within "Item 1. Business" in this Annual Report.

Results of Operations

Comparison of the Years Ended December 31, 2018 and 2017

The following table sets forth our results of operations for the years ended December 31, 2018 and 2017:

	Year ended December 31,		
	2018	2017	Change
	(in thousands)		
Grant revenues	$1,120	$185	$935
Operating expenses:			
Research and development	71,152	65,663	5,489
License fees	436	864	(428)
General and administrative	24,998	21,045	3,953
Total operating expenses	96,586	87,572	9,014
Loss from operations	(95,466)	(87,387)	(8,079)
Other income (expense):			
Interest income	1,639	1,055	584
Interest expense	(4,199)	(3,672)	(527)
Gain/(loss) on disposition of fixed assets	(10)	11	(21)
Loss on extinguishment of debt	—	(1,786)	1,786
Total other income (expense)	(2,570)	(4,392)	1,822
Net loss	$(98,036)	$(91,779)	$(6,257)

Grant Revenues

We received revenue from one grant in 2018 and two grants in 2017. For additional information about grants that we have received, see Note 9 to the audited financial statements contained within "Item 8 - Financial Statements and Supplementary Data" in this Annual Report.

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CPRIT Grant

On August 9, 2017, we entered into a grant agreement with the Cancer Prevention and Research Institute of Texas, or CPRIT, whereby CPRIT awarded approximately $16.9 million to fund research of a cancer therapy involving rivo-cel. In 2017 we received CPRIT funds of $4.2 million up front which was initially recorded as deferred revenue and is included in restricted cash on our balance sheet. From the inception of the CPRIT grant to date, we recognized $1.1 million of deferred revenue for expenses incurred under the CPRIT grant, of which we recognized approximately $1.1 million and $0.1 million in 2018 and 2017, respectively.

NIH Grant

During 2013, we entered into a grant agreement with the NIH. The grant was a modular multi-year grant with funds being awarded each year based on the progress of the program being funded. Grant money was not received until expenses for the program were incurred. We were awarded approximately $1.4 million through the grant expiration on March 31, 2017. Grant revenues include approximately $0.1 million received from the NIH grant in 2017.

Research and Development Expenses

Research and development expenses increased $5.5 million in the year ended December 31, 2018, compared with the year ended December 31, 2017. The overall increase was due to increases in costs related to our GoCAR-T program of $3.0 million, increases in general research and development expenses of $6.5 million, and a decrease in expenditures related to rivo-cel of $4.0 million.

We increased our investment in our GoCAR-T program in 2018. Expenses related to BPX-601 increased in 2018, compared with 2017. During 2018, we began enrollment of patients in our BPX-601 clinical trial, whereas in 2017 expenses related to BPX-601 were primarily related to the startup costs of the clinical trial, along with pre-clinical studies and process development activities. Expenses related to BPX-603 and BPX-802 increased in 2018 compared with 2017, primarily due to expenses related to pre-clinical studies, process development activities and regulatory activities in preparation of future IND applications.

Expenses related to rivo-cel decreased $4.0 million in 2018 compared with 2017. The decrease is primarily due to reduced patient treatment costs and product manufacturing costs as a result of reduced patient enrollment in 2018.

General research and development expenses increased $6.5 million in 2018 compared with 2017. The increase is primarily comprised of increases in non-cash charges for depreciation and share-based compensation and increased personnel costs.

License fees

License fees were $0.4 million for the year ended December 31, 2018, compared to $0.9 million of license fees in the same period of 2017. Year 2017 license fee expense reflected the achievement of clinical milestones for BPX-601 and BPX-701.

General and Administrative Expenses

General and administrative expenses were $25.0 million and $21.0 million for the years ended December 31, 2018 and 2017, respectively. The increase of $4.0 million in 2018 was primarily due to our overall growth, including an increase in personnel related costs, primarily due to hiring additional employees and severance costs, higher facility costs and increased legal, accounting and travel expenses.

Other Expense

Other expense was $2.6 million and $4.4 million in the years ended December 31, 2018 and 2017, respectively. The decrease of $1.8 million is primarily due to the $1.8 million loss on the extinguishment of debt resulting from the refinance of our previous loan from Hercules with our new loan from Oxford recorded in 2017. See Note 8 to the audited financial statements, included in this annual report, for additional information about long-term debt.

Liquidity and Capital Resources

Going Concern and Management’s Plans

We are a clinical stage biopharmaceutical company with a limited operating history. We have not generated any revenue from the sale of any products. To date, we have financed our operations primarily through equity and debt financings and grants. Our ability to continue as a going concern is dependent upon our ability to obtain additional funding to continue our operations. Based on our research and development plans and our timing expectations related to the progress of our programs, we believe there is substantial doubt that our cash, cash equivalents and investment

securities of $98.0 million as of December 31, 2018 will be sufficient to fund our operating expenses and capital expenditure requirements through the first quarter of 2020. We have based this estimate on assumptions that may prove to be wrong, and we could utilize our available capital resources sooner than we currently expect.

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Furthermore, our operating plans may change, and we may need additional funds to meet operational needs and capital requirements for product development and commercialization sooner than planned. To continue as a going concern, we may postpone or eliminate some of our research and development programs and reduce our administrative costs. We may also intend to seek additional funding including, but not limited to any or all of the following potential sources:

In August 2018, we filed a registration statement on Form S-3 for the offer and sale by the Company of its securities in one or more offerings for up to an aggregate maximum offering price of $150.0 million. The registration statement became effective August 23, 2018. We intend to obtain additional funding through the sale of our securities in one or more offerings, however we cannot assure you that we will be able to do so on favorable terms. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of our stockholders will be diluted, and the terms may include liquidation or other preferences that adversely affect the rights of our existing stockholders. The incurrence of indebtedness would result in increased fixed payment obligations and could involve certain restrictive covenants, such as limitations on our ability to incur additional debt, limitations on our ability to acquire or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business.

On October 5, 2018, we entered into an Open Market Sale Agreement[SM] with Jefferies LLC, as sales agent, pursuant to which we may offer and sell, from time to time, through Jefferies, shares of the Company's common stock having an aggregate offering price of up to $60.0 million. The shares will be offered and sold pursuant to the Company's shelf registration statement on Form S-3.

We may also consider new collaborations or selectively partnering our technology. If we raise additional funds through strategic partnerships and alliances and licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies or product candidates or grant licenses on terms unfavorable to us.

Funding Requirements

Our primary uses of capital are, and we expect will continue to be, compensation and related expenses, third-party clinical research and development services, laboratory and related supplies, clinical costs, legal and other regulatory expenses, facility costs and general overhead costs.

The successful development of any of our product candidates is highly uncertain. As such, at this time, we cannot reasonably estimate or know the nature, timing and costs of the efforts that will be necessary to complete the development of rivo-cel, our GoCAR-T program or our other current and future product candidates. We are also unable to predict when, if ever, material net cash inflows will commence from the sale of product candidates.

Cash Flows

The following table sets forth a summary of our cash flows for the years ended December 31, 2018 and 2017:

	Year ended December 31,	
	2018	2017
	(in thousands)	
Net cash used in operating activities	$(74,782)	$(72,984)
Net cash provided by (used in) investing activities	10,410	(3,253)
Net cash provided by financing activities	68,109	78,486
Effect of changes in foreign currency exchange rates on cash	(98)	—
Net cash inflow	$3,639	$2,249

Operating Activities

Net cash used in operating activities in the year ended December 31, 2018 was primarily comprised of operating expenses of $76.1 million, after excluding non-cash charges for share-based compensation and depreciation of $20.5 million. Other cash used in operating activities included cash interest payments of $3 million. Investment income and fluctuations in net working capital of $4.3 million partially offset cash used in operating activities.

Net cash used in operating activities of $73.0 million for the year ended December 31, 2017, was primarily comprised of operating expenses of $70.4 million, after excluding non-cash charges for share-based compensation and depreciation of $17.1 million. Other cash used in operating activities included cash interest payments of $3.0 million.

Investment income and fluctuations in net working capital of $0.4 million partially offset cash used in operating activities.

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Investing Activities

Net cash provided by investing activities in the year ended December 31, 2018 was $10.4 million. We reduced our investment in marketable securities $12.0 million to fund our operations and used $1.6 million to purchase property and equipment.

Net cash used in investing activities for the year ended December 31, 2017 was $3.3 million. During 2017 we reduced our investment in marketable securities $8.8 million to fund our operations and used $12.1 million to purchase property and equipment.

Financing Activities

Net cash provided by financing activities for the year ended December 31, 2018 was $68.1 million, which was primarily derived from proceeds of $64.6 million received from public stock offering net of offering costs, proceeds of $3.3 million received from the exercise of stock options and proceeds of $0.2 million received from ESPP purchases.

Net cash provided by financing activities for the year ended December 31, 2017 was $78.5 million, which was primarily derived from proceeds of $64.7 million received from public stock offering net of offering costs, proceeds of $1.5 million received from the exercise of stock options, proceeds of $0.3 million received from ESPP purchases, proceeds of $45.0 million received from borrowings on long-term debt, offset by repayment of $32.7 million on debt and $0.2 million of debt issuance costs.

Critical Accounting Policies and Significant Estimates

Our financial statements are prepared in accordance with U.S. generally accepted accounting principles, or GAAP. The preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues, costs and expenses and related disclosures. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. In many instances, we could have reasonably used different accounting estimates, and in other instances changes in the accounting estimates are reasonably likely to occur from period to period. Accordingly, actual results could differ significantly from management’s estimates. To the extent that there are material differences between these estimates and actual results, our future financial statement presentation, financial condition, results of operations and cash flows will be affected. While our significant accounting policies are described in the Notes to our financial statements, we believe that the accounting policies discussed below are critical to understanding our historical and future performance, as these policies related to the more significant areas involving management’s judgments and estimates. Our management has discussed the development and selection of these critical accounting estimates with the audit committee of our board of directors and the audit committee has reviewed the company's disclosure relating to it in this MD&A.

Revenue Recognition

To date, we have only recognized revenue from government grants and we have not generated any product revenue. We have received funds from the CPRIT, and the NIH, which are awarded based on the progress of the program being funded. In cases when the grant money is not received until expenses for the program are incurred, we accrue the revenue based on the costs incurred for the programs associated with the grant.

In the future, we may generate revenue from a combination of product sales, government or other third-party grants, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements or a combination of these approaches. We expect that any revenue we generate will fluctuate from quarter to quarter as a result of the timing and amount of license fees, milestone and other payments, and the amount and timing of payments that we receive upon the sale of our products, to the extent any are successfully commercialized. If we fail to complete the development of our product candidates in a timely manner or obtain regulatory approval of them, our ability to generate future revenue, and our results of operations and financial position, would be materially adversely affected. See discussion of “Collaboration Agreements” in Note 3 to the audited financial statements included in this Annual Report.

Licenses and Patents

Licenses and patent costs are expensed as incurred. Costs related to the license of patents from third parties and internally developed patents are classified as research and development expenses. Legal costs related to patent

applications and maintenance are classified as general and administrative expenses.

Research and Development

Research and development costs are expensed as incurred. Clinical trial and other development costs incurred by third parties are expensed as the contracted work is performed. We accrue for costs incurred as the services are being provided by monitoring the status of the clinical trial or project and the invoices received from our external service providers. We adjust our accrual as actual costs become known. Where contingent milestone payments are due to third parties under research and development arrangements, the milestone payment obligations are expensed when the milestone events are achieved.

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Contract Manufacturing Services

Contract manufacturing services are expensed as incurred. Prepaid costs are capitalized and amortized as services are performed.

Share-Based Compensation

We account for share-based compensation by calculating the fair value of equity awards on the date of grant. We calculate the fair value of stock options using the Black-Scholes pricing model, which requires a number of estimates, including the expected lives of awards, interest rates, stock volatility and other assumptions. Restricted stock is measured based on the fair market value of the underlying stock on the date of grant. If the awards are classified as liability awards, the fair value is remeasured at each reporting date and the compensation expense is adjusted accordingly. Additionally, we apply a forfeiture rate to estimate the number of grants that will ultimately vest, as applicable, and adjust the expense as these awards vest. All of our current equity awards are service based awards and the share-based compensation cost is being recognized over the requisite service period of the awards on a straight-line basis. Our share-based compensation expense has increased due to the growth in the number of our employees and due to the increase in the valuation of equity awards as a result of becoming a public company in December of 2014.

The following table sets forth the share-based compensation expense included in our results of operations for the years ended December 31, 2018 and 2017:

	Year Ended December 31,	
	2018	2017
	(in thousands)	
General and administrative	$7,479	$7,128
Research and development	6,345	6,441
Total	$13,824	$13,569

Income Taxes

We are subject to federal and state taxes in the U.S. and in some foreign jurisdictions. Judgement is required in determining our provision for income taxes, our deferred tax assets and liabilities and any valuation allowance recorded against our net deferred tax assets. As of December 31, 2018, we had recorded a full valuation allowance on our net U.S. and foreign deferred tax assets because we expect that it is more likely than not that our deferred tax assets will not be realized in the foreseeable future. Should the actual amounts differ from our estimates, the amount of our valuation allowance could be materially impacted.

On December 22, 2017, the U.S. government enacted the Tax Cuts and Jobs Act. The Tax Cuts and Jobs Act significantly revised how U.S. taxes corporations. The provisions of the Tax Cuts and Jobs Act that impacted us include, but are not limited to, (1) lowered the U.S. Corporate income tax rate from 35% to 21%, (2) limitations on the maximum deduction for net operating loss (NOL) carryforwards generated in tax years beginning after December 31, 2017, to 80% of a taxpayer’s taxable income and (3) elimination of certain business expenditures. In conjunction with the Tax Cuts and Jobs Act, the SEC staff issued SAB 118, which allowed companies to record provisional amounts during a measurement period not to extend beyond one year of the enactment date. We have previously reported provisional amounts of the income tax effects of the Tax Cuts and Jobs Act for which the accounting was incomplete, but a reasonable estimate could be determined. During the year ended December 31, 2018, our accounting for the income tax effects of the Tax Cuts and Jobs Act was completed without material changes to the previously provided estimates.

We account for uncertain tax positions in accordance with the provisions of the Accounting Standards Codification (ASC) 740, Income Taxes. When uncertain tax positions exist, we recognize the tax benefit of tax positions to the extent that the benefit will more likely than not be realized. The determination as to whether the tax benefit will more likely than not be realized is based upon the technical merits of the tax position as well as consideration of the available facts and circumstances. As of December 31, 2018 and 2017, we had no uncertain tax positions and no interest or penalties have been charged to us for the years ended December 31, 2018 and 2017. If incurred, we will classify any interest and penalties as a component of interest expense and operating expense, respectively. We are

subject to routine audits by taxing jurisdictions; however, there are currently no audits for any tax periods in progress. The tax years 2005 through 2018 remain open to examination by the U.S. Internal Revenue Service.

Recently Issued Accounting Pronouncements

See Note 3 to the Notes to Consolidated Financial Statements in "Item 8 - Financial Statements and Supplementary Data" in this Annual Report for discussion regarding recent accounting pronouncements.

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Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements (as defined by applicable regulations of the SEC) that are reasonably likely to have a current or future material effect on our financial condition, results of operations, liquidity, capital expenditures or capital resources.

JOBS Act

In April 2012, the JOBS Act was enacted. Section 107(b) of the JOBS Act provides that an "emerging growth company" may take advantage of an extended transition period for complying with new or revised accounting standards. Thus, an emerging growth company can delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. We have irrevocably elected not to avail ourselves of this extended transition period, and, as a result, we will adopt new or revised accounting standards on the relevant dates on which adoption of such standards is required for other public companies.

Subject to certain conditions set forth in the JOBS Act, as an “emerging growth company,” we intend to rely on certain of these exemptions including without limitation with respect to, (1) providing an auditor’s attestation report on our system of internal controls over financial reporting pursuant to Section 404(b) of the Sarbanes-Oxley Act and (2) complying 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, known as the auditor discussion and analysis. We will remain an “emerging growth company” until the earliest of (a) the last day of the fiscal year in which we have total annual gross revenues of $1 billion or more, (b) December 31, 2019, (c) the date on which we have issued more than $1 billion in non-convertible debt during the previous three years or (d) the date on which we are deemed to be a large accelerated filer under the rules of the SEC.

ITEM 7A. Quantitative and Qualitative Disclosures About Market Risk

The primary objective of our investment activities is to preserve our capital to fund our operations. We also seek to realize income from our investments without assuming significant risk. To achieve our objectives, we invest our cash allocated to fund our short-term liquidity requirements with prominent financial institutions in bank depository accounts and institutional money market funds. We invest the remainder of our cash in corporate debt securities and municipal bonds rated at least A quality or equivalent, U.S. Treasury notes and bonds and U.S. and state government agency-backed securities. As of December 31, 2018, we had cash, cash equivalents, restricted cash and investment in marketable securities of $98.0 million.

A portion of our investments may be subject to interest rate risk and could fall in value if market interest rates increase. However, because our investments are primarily short-term in duration, we believe that our exposure to interest rate risk is not significant and a 1% movement in market interest rates would not have a significant impact on the total value of our portfolio. We actively monitor changes in interest rates.

We are exposed to changes in foreign currency exchange rates. We have contracts with entities in areas outside the U.S. that are denominated in a foreign currency. Most of our assets are located within the U.S. and are not subject to changes in foreign currency exchange rates, however a portion of our operating expense is denominated in foreign currencies, primarily pounds sterling and euros. We do not engage in any hedging transactions to mitigate the effect of changes in foreign currency exchange rates. While the effect of changes in foreign currency exchange rates has not had a material effect on our financial results or financial condition to date, we cannot assure you that fluctuations in foreign currency exchange rates will not have a material effect on our future results.

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ITEM 8. Financial Statements and Supplementary Data

Index to Financial Statements

The financial statements of Bellicum Pharmaceuticals, Inc. listed below are set forth in Item 8 of this Annual Report for the year ended December 31, 2018:

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Consolidated Statements of Operations and Comprehensive Loss	72
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Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Bellicum Pharmaceuticals, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Bellicum Pharmaceuticals, Inc. (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations and comprehensive loss, stockholders' equity and cash flows for each of the two years in the period ended December 31, 2018, and 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 at December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

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 2 to the financial statements, the Company has suffered recurring losses from operations and has stated that substantial doubt exists about the Company’s ability to continue as a going concern. Management's evaluation of the events and conditions and management’s plans regarding these matters are also described in Note 2. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company’s auditor since 2014.

Houston, Texas

March 12, 2019

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Bellicum Pharmaceuticals, Inc.
Consolidated Balance Sheets
(in thousands, except for par value and share data)

	December 31, 2018	December 31, 2017
ASSETS		
Current assets:		
Cash and cash equivalents	$43,695	$38,839
Investment securities, available for sale	49,304	60,057
Accounts receivable, interest and other receivables	909	320
Prepaid expenses and other current assets	1,387	2,434
Total current assets	95,295	101,650
Investment securities, available for sale - long-term	—	1,368
Property and equipment, net	20,878	25,942
Restricted cash	4,973	6,190
Other assets	355	378
TOTAL ASSETS	$121,501	$135,528
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$3,774	$3,287
Accrued expenses and other current liabilities	8,589	6,392
Current portion of capital lease obligations	40	31
Current portion of deferred revenue	2,983	2,049
Current portion of deferred rent	418	397
Total current liabilities	15,804	12,156
Long-term liabilities:		
Long-term debt, net of deferred financing costs	35,832	34,946
Capital lease obligations	91	131
Deferred revenue	—	2,054
Deferred rent	1,296	1,593
TOTAL LIABILITIES	53,023	50,880
Commitments and contingencies: (Note 12)		
Stockholders' Equity:		
Preferred stock: $0.01 par value; 10,000,000 shares authorized: no shares issued and outstanding	—	—
Common stock: $0.01 par value; 200,000,000 shares authorized at December 31, 2018 and 2017; 44,242,059 shares issued and 43,564,596 shares outstanding at December 31, 2018; 33,962,640 shares issued and 33,285,177 shares outstanding at December 31, 2017	442	340
Treasury stock: 677,463 shares held at December 31, 2018 and 2017	(5,056)	(5,056)
Additional paid-in capital	493,784	411,922
Accumulated other comprehensive loss	(144)	(46)
Accumulated deficit	(420,548)	(322,512)
Total stockholders' equity	68,478	84,648
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$121,501	$135,528

The accompanying notes are an integral part of these consolidated financial statements.

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Bellicum Pharmaceuticals, Inc.
Consolidated Statements of Operations and Comprehensive Loss
(in thousands, except share and per share amounts)

	Year Ended December 31,	
	2018	2017
REVENUES		
Grants	$1,120	$185
Total revenues	1,120	185
OPERATING EXPENSES		
Research and development	71,152	65,663
License fees	436	864
General and administrative	24,998	21,045
Total operating expenses	96,586	87,572
LOSS FROM OPERATIONS	(95,466)	(87,387)
OTHER INCOME (EXPENSE)		
Interest income	1,639	1,055
Interest expense	(4,199)	(3,672)
Gain/(Loss) on disposal of assets	(10)	11
Loss on extinguishment of debt	—	(1,786)
Total other expense	(2,570)	(4,392)
NET LOSS	$(98,036)	$(91,779)
Net loss per common share attributable to common shareholders, basic and diluted	$(2.44)	$(2.89)
Weighted-average shares outstanding-basic and diluted	40,230,580	31,714,164
Net Loss	$(98,036)	$(91,779)
Other comprehensive loss:		
Unrealized gain (loss) on securities, net	1	(63)
Foreign currency translation adjustment	(99)	—
Comprehensive loss	$(98,134)	$(91,842)

The accompanying notes are an integral part of these consolidated financial statements.

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Bellicum Pharmaceuticals, Inc.
Consolidated Statements of Stockholders' Equity
Years Ended December 31, 2018 and 2017
(amounts in thousands, except share data)

	Common Stock		Treasury Stock		Additional Paid-In Capital	Accumulated Deficit	Accumulated Other Comprehensive Income (Loss)	Total Stockholders' Equity
	Shares	Amount	Shares	Amount				
Balance, December 31, 2016	27,833,028	$ 278	(677,463)	$(5,056)	$332,068	$(230,733)	$ 17	$ 96,574
Share-based compensation					13,569			13,569
Exercise of stock options	344,958	4			1,482			1,486
Issuance of common stock - Employee Stock Purchase Plan	34,654				293			293
Issuance of common stock in a public offering, net	5,750,000	58			64,510			64,568
Comprehensive loss						(91,779)	(63)	(91,842)
Balance, December 31, 2017	33,962,640	$ 340	(677,463)	$(5,056)	$411,922	$(322,512)	$ (46)	$ 84,648
Share-based compensation					13,824			13,824
Exercise of stock options	1,016,803	10			3,260			3,270
Issuance of common stock - Employee Stock Purchase Plan	45,390				205			205
Issuance of common stock in a public offering, net	9,200,000	92			64,573			64,665
Issuance of common stock upon vesting of restricted stock units	17,226							—
Comprehensive loss						(98,036)	(98)	(98,134)
Balance, December 31, 2018	44,242,059	$ 442	(677,463)	$(5,056)	$493,784	$(420,548)	$ (144)	$ 68,478

The accompanying notes are an integral part of these consolidated financial statements.

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Bellicum Pharmaceuticals Inc.
Consolidated Statements of Cash Flows
(in thousands)

	Year Ended December 31,	
CASH FLOWS FROM OPERATING ACTIVITIES:	2018	2017
Net loss	$(98,036)	$(91,779)
Adjustments to reconcile net loss to net cash used in operating activities:		
Share-based compensation	13,824	13,569
Depreciation expense	6,698	3,564
Amortization of premium on investment securities, net	94	302
Amortization of lease liability	(276)	(102)
Amortization of deferred financing costs	886	774
Loss on extinguishment of debt	—	1,786
(Gain)/Loss on disposal of property and equipment	10	(11)
Changes in operating assets and liabilities:		
Accounts receivable	(589)	14
Prepaid expenses and other current assets	1,047	(930)
Other assets	23	(95)
Accounts payable	460	(512)
Accrued liabilities and other	2,197	(3,667)
Deferred revenue – grants	(1,120)	4,103
NET CASH USED IN OPERATING ACTIVITIES	(74,782)	(72,984)
CASH FLOWS FROM INVESTING ACTIVITIES:		
Proceeds from sale of investment securities	71,362	63,737
Purchases of investment securities	(59,335)	(54,895)
Proceeds on disposition of equipment	—	39
Purchases of property and equipment	(1,617)	(12,134)
CASH PROVIDED BY (USED IN) INVESTING ACTIVITIES	10,410	(3,253)
CASH FLOWS FROM FINANCING ACTIVITIES:		
Proceeds from debt	—	45,000
Payment on debt	—	(32,688)
Payment of debt issuance costs	—	(150)
Payment on capital lease obligations	(31)	(23)
Proceeds from issuance of common stock, net	64,860	64,860
Proceeds from exercise of stock options	3,270	1,486
Proceeds from issuance of common stock - ESPP	205	293
Payment of issuance costs on common stock	(195)	(292)
NET CASH PROVIDED BY FINANCING ACTIVITIES	68,109	78,486
EFFECT OF EXCHANGE RATE CHANGES ON CASH	(98)	—
NET CHANGE IN CASH, CASH EQUIVALENTS AND RESTRICTED CASH	3,639	2,249
CASH, CASH EQUIVALENTS AND RESTRICTED CASH AT BEGINNING OF YEAR	45,029	42,780
CASH, CASH EQUIVALENTS AND RESTRICTED CASH AT END OF YEAR	$48,668	$45,029
SUPPLEMENTAL CASH FLOW INFORMATION:		
Cash paid during the period for interest	$3,025	$2,951
NON-CASH INVESTING AND FINANCING ACTIVITIES		
Purchases of property and equipment in accounts payables and accrued liabilities	$27	$872

Accrued debt issuance costs	$—	$3,045
Capital lease obligations incurred for equipment	$—	$23

The accompanying notes are an integral part of these consolidated financial statements.

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Notes to the Consolidated Financial Statements

NOTE 1 - ORGANIZATION AND BUSINESS DESCRIPTION

Bellicum Pharmaceuticals, Inc., ("Bellicum"), was incorporated in Delaware in July 2004 and is based in Houston, Texas. Bellicum is a clinical stage biopharmaceutical company focused on discovering and developing novel cellular immunotherapies for various forms of cancer, including both hematological cancers and solid tumors, as well as orphan inherited blood disorders. Bellicum is devoting substantially all of its present efforts to developing next-generation product candidates in some of the most important areas of cellular immunotherapy, including CAR T and hematopoietic stem cell transplantation.

In 2017, Bellicum formed two wholly-owned subsidiaries, Bellicum Pharma Limited, a private limited company organized under the laws of the United Kingdom, and Bellicum Europe GmbH, a private limited liability company organized under Swiss law. In 2018, Bellicum formed Bellicum Pharma GmbH, a private limited liability company organized under German law. All were formed for the purpose of developing product candidates in Europe. Bellicum, Bellicum Pharma Limited, Bellicum Europe GmbH and Bellicum Pharma GmbH are collectively referred to herein as the "Company".

NOTE 2 - BASIS OF PRESENTATION AND MANAGEMENT PLANS
Going Concern

The consolidated financial statements have been prepared on a going concern basis, which assumes the Company will continue to realize its assets and discharge its liabilities in the normal course of business. The continuation of the Company as a going concern is dependent upon the ability of the Company to obtain necessary funding to continue operations. As of December 31, 2018, the Company has incurred an accumulated deficit of $420.5 million since inception and had not yet generated any revenue from operations. Additionally, , the Company continues to expend cash to continue its R&D efforts. Management anticipates that its cash on hand as of December 31, 2018, grants and other cash inflows will be insufficient to fund its operations within one year from the financial statement issuance date and therefore, substantial doubt about the entity's ability to continue as a going concern exists. These consolidated financial statements do not include any adjustments to the recoverability and classification of recorded asset amounts and classification of liabilities that might be necessary should the Company be unable to continue as a going concern. The Company may seek additional funding through a combination of equity offerings, debt financings, government or other third-party funding, commercialization, marketing and distribution arrangements, other collaborations, strategic alliances and licensing arrangements and delay planned cash outlays or a combination thereof. Management cannot be certain that such events or a combination thereof can be achieved.
The accompanying financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America. Any reference in these footnotes to applicable guidance is meant to refer to the authoritative U.S. generally accepted accounting principles ("GAAP") as found in the Accounting Standards Codification ("ASC") and Accounting Standards Update ("ASU") of the Financial Accounting Standards Board ("FASB").

The Company is subject to risks common to companies in the biotechnology industry and the future success of the Company is dependent on its ability to successfully complete the development of, and obtain regulatory approval for, its product candidates, manage the growth of the organization, obtain additional financing necessary in order to develop, launch and commercialize its product candidates, and compete successfully with other companies in its industry.

NOTE 3 - SIGNIFICANT ACCOUNTING POLICIES

Use of Estimates

The preparation of the financial statements in accordance with GAAP requires management to make certain estimates and judgments that affect the reported amounts of assets, liabilities, and expenses. Actual results could differ from those estimates.

Consolidation

All financial information presented includes the accounts of the Company and its wholly-owned subsidiaries, neither of which have had any material activity to date. All significant intercompany balances and transactions have been eliminated in consolidation.

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Revenue Recognition
The Company has not yet generated any revenue from product sales. The Company's source of revenue in 2018 and 2017 has been from grants. When grant funds are received after costs have been incurred, the Company accrues revenue and records a grant receivable. Cash received from grants in advance of incurring qualifying costs is recorded as deferred revenue and recognized as revenue when qualifying costs are incurred.
Cash and Cash Equivalents
The Company considers all short-term, highly liquid investments with maturity of three months or less from the date of purchase to be cash equivalents.
Investment Securities
Consistent with its investment policy, the Company invests its cash allocated to fund its short-term liquidity requirements with prominent financial institutions in bank depository accounts and institutional money market funds. The Company invests the remainder of its cash in corporate debt securities and municipal bonds rated at least A quality or equivalent, U.S. Treasury notes and bonds and U.S. and state government agency-backed securities.
The Company determines the appropriate classification of investment securities based on whether they represent the investment of funds available for current operations, as defined in ASC 210-10-45-1 and ASC 210-10-45-2. The Company reevaluates its classification as of each balance sheet date. All investment securities owned are classified as available-for-sale. The cost of securities sold is based on the specific identification method. Investment securities are recorded as of each balance sheet date at fair value, with unrealized gains and, to the extent deemed temporary, unrealized losses reported as accumulated other comprehensive gain (loss), a separate component of stockholders' equity. Interest and dividend income on investment securities, accretion of discounts and amortization of premiums and realized gains and losses are included in interest income in the statements of operations and comprehensive income (loss).
An investment security is considered to be impaired when a decline in fair value below its cost basis is determined to be other than temporary. The Company evaluates whether a decline in fair value of an investment security is below its cost basis is other than temporary using available evidence. In the event that the cost basis of the investment security exceeds its fair value, the Company evaluates, among other factors, the amount and duration of the period that the fair value is less than the cost basis, the financial health of and business outlook for the issuer, including industry and sector performance, and operational and financing cash flow factors, overall market conditions and trends, the Company's intent to sell the investment security and whether it is more likely than not the Company would be required to sell the investment security before its anticipated recovery. If a decline in fair value is determined to be other than temporary, the Company records an impairment charge in the statement of operations and comprehensive loss and establishes a new cost basis in the investment.
Property and Equipment
Leasehold improvements, furniture, equipment and software are recorded at cost and are depreciated using the straight-line method over the estimated useful lives of the related assets, which range from three to five years. Leasehold improvements are amortized over the shorter of the estimated useful life or the remaining lease term.
Impairment of Long-Lived Assets
The Company reviews long-lived assets for impairment when events or changes in business conditions indicate that their carrying value may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset to the estimated undiscounted future cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated future cash flows, an impairment charge is recognized in the amount by which the carrying amount of the asset exceeds the fair value of the asset. There were no impairment charges related to long-lived assets for the years ended December 31, 2018 and 2017.
Debt Issuance Costs

Costs related to debt issuance are presented in the balance sheet as a direct deduction from the carrying amount of the debt liability, consistent with debt discounts and are amortized using the effective interest method. Amortization of debt issuance costs are included in interest expense.

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Rent and Deferred Rent
The Company recognizes rent expense for leases with increasing annual rents on a straight-line basis over the term of the lease. The amount of rent expense in excess of cash payments is classified as deferred rent. Any lease incentives received are deferred and amortized over the term of the lease.

Fair Value of Financial Instruments
Accounting standards include disclosure requirements around fair values used for certain financial instruments and establish a fair value hierarchy. The three-tier hierarchy prioritizes valuation inputs into three levels based on the extent to which inputs used in measuring fair value are observable in the market, as described further in Note 5.

The Company believes the recorded values of its financial instruments, including cash and cash equivalents, accounts payable and accrued liabilities approximate their fair values due to the short-term nature of these instruments.

Financial Instruments and Credit Risks
Financial instruments that potentially subject the Company to credit risk include cash and cash equivalents, investment securities, and accounts receivable. Cash is deposited in demand accounts in federally insured domestic institutions to minimize risk. Insurance is provided through the Federal Deposit Insurance Corporation (“FDIC”) and Security Investor Protection Corporation (“SIPC”). Although the balances in these accounts exceed the federally insured limit from time to time, the Company has not incurred losses related to these deposits.
Equity Issuance Costs
Equity issuance costs represent costs paid to third parties in order to obtain equity financing. These costs have been netted against the proceeds of the equity issuances.
Licenses and Patents
Licenses and patent costs for technologies that are utilized in research and development and have no alternative future use are expensed as incurred. Costs related to the license of patents from third parties and internally developed patents are classified as research and development expenses. Legal costs related to patent applications and maintenance are classified as general and administrative expenses.
Clinical Trials
The Company estimates its clinical trial expense accrual for a given period based on the number of patients enrolled at each site, estimated cost per patient, and the length of time each patient has been in the trial, less amounts previously billed. These accruals are recorded in accrued expenses and other current liabilities, and the related expense is recorded in research and development expense.
Research and Development
Research and development expenses consist of expenses incurred in performing research and development activities, including compensation and benefits for research and development employees and consultants, facilities expenses, overhead expenses, cost of laboratory supplies, manufacturing expenses, fees paid to third parties and other outside expenses.
Research and development costs are expensed as incurred. Clinical trial and other development costs incurred by third parties are expensed as the contracted work is performed. The Company accrues for costs incurred as the services are being provided by monitoring the status of the clinical trial or project and the invoices received from its external service providers. The Company estimates depend on the timeliness and accuracy of the data provided by the vendors regarding the status of each project and total project spending. The Company adjusts its accrual as actual costs become known. Where contingent milestone payments are due to third parties under research and development arrangements, the milestone payment obligations are expensed when the milestone events are achieved.
Collaboration Agreements

The Company enters into collaboration agreements that include varying arrangements regarding which parties perform and bear the costs of research and development activities. The Company may share the costs of research and development activities with a collaborator, or

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the Company may be reimbursed for all or a significant portion of the costs of the Company's research and development activities. The Company records its internal and third-party development costs associated with these collaborations as research and development expenses. When the Company is entitled to reimbursement of all or a portion of the research and development expenses that it incurs under a collaboration, the Company records those reimbursable amounts as a deduction to the research and development expenses. If the collaboration is a cost-sharing arrangement in which both the Company and its collaborator perform development work and share costs, the Company also recognizes, as research and development expenses in the period when its collaborator incurs development expenses, the portion of the collaborator's development expenses that the Company is obligated to reimburse.

Contract Manufacturing Services

Contract manufacturing services are expensed as incurred. Prepaid expenses are capitalized and amortized as services are performed.

Share-Based Compensation

The Company accounts for its share-based compensation in accordance with ASC 718, Compensation — Stock Compensation, which requires the measurement and recognition of compensation expense for all share-based payment awards made to employees and directors to be recognized in the financial statements, based on their fair value. The Company measures share-based compensation to consultants in accordance with ASC 505-50, Equity-Based Payments to Non-Employees, and recognizes the fair value of the award over the period the services are rendered. The Company uses the Black-Scholes option-pricing model to estimate the fair value of stock option awards. The fair value is recognized as expense, net of estimated forfeitures, over the requisite service period, which is generally the vesting period of the respective award on a straight-line basis.

Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. This method also requires the recognition of future tax benefits such as net operating loss and tax credit carry forwards, to the extent that realization of such benefits is more likely than not. A valuation allowance is recorded when the realization of future tax benefits is uncertain. The Company records a valuation allowance for the full amount of deferred tax assets, which would otherwise be recorded for tax benefits relating to the operating loss and tax credit carryforwards, as realization of such deferred tax assets cannot be determined to be more likely than not.

Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in the statement of operations in the period that includes the enactment date.

On December 22, 2017, the U.S. government enacted the Tax Cuts and Jobs Act. The Tax Cuts and Jobs Act significantly revised how U.S. taxes corporations. The provisions of the Tax Cuts and Jobs Act that impacted the Company include, but are not limited to, (1) lowered the U. S. corporate income tax rate from 35% to 21%, (2) limitations on the maximum deduction for net operating loss (NOL) carryforwards generated in tax years beginning after December 31, 2017, to 80 percent of a taxpayer’s taxable income and (3) elimination of certain business expenditures. In conjunction with the Tax Cuts and Jobs Act, the SEC staff issued SAB 118, which allowed companies to record provisional amounts during a measurement period not to extend beyond one year of the enactment date. The Company previously reported provisional amounts of the income tax effects of the Tax Cuts and Jobs Act for which the accounting was incomplete, but a reasonable estimate could be determined. During the year ended December 31, 2018, our accounting for the income tax effects of the Tax Cuts and Jobs Act was completed without material changes to the previously provided estimates.

The Company accounts for uncertain tax positions in accordance with the provisions of ASC 740, Income Taxes. When uncertain tax positions exist, the Company recognizes the tax benefit of tax positions to the extent that the benefit will more likely than not be realized. The determination as to whether the tax benefit will more likely than not be realized is based upon the technical merits of the tax position as well as consideration of the available facts and circumstances. As of December 31, 2018 and 2017, the Company had no uncertain tax positions and no interest or penalties have been charged to the Company for the years ended December 31, 2018 and 2017. If incurred, the Company will classify any interest and penalties as a component of interest expense and operating expense, respectively. The Company is subject to routine audits by taxing jurisdictions; however, there are currently no audits for any tax periods in progress. The tax years 2005 through 2018 remain open to examination by the Internal Revenue Service.

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Comprehensive Loss

Comprehensive income (loss) is defined as the change in equity of a business enterprise during a period, from transactions, and other events and circumstances from non-owner sources. Components of comprehensive income (loss) includes, among other items, unrealized gains and losses on the changes in fair value of investments and unrealized gains and losses on the change in foreign currency exchange rates. These components are added, net of their related tax effect, to the reported net income (loss) to arrive at comprehensive income (loss). The components of accumulated other comprehensive loss at December 31, 2018 and 2017, on the Company's balance sheet was comprised of the net unrealized holding losses on the Company's investment securities, and the effect of changes in foreign currency exchange rates. See Note 5 for further detail of the unrealized holding gains and losses on the Company's investment securities.

Net Loss and Net Loss per Share of Common Stock Attributable to Common Stockholders

Basic net loss per share attributable to common stockholders is calculated by dividing the net loss attributable to common stockholders by the weighted-average number of shares of common stock outstanding during the period without consideration for common stock equivalents.

The following outstanding shares of common stock equivalents were excluded from the computations of diluted net loss per shares of common stock attributable to common stockholders for the periods presented as the effect of including such securities would be anti-dilutive.

	Number of shares	
	December 31, 2018	December 31, 2017
Options to purchase common stock	5,759,246	5,286,472
Unvested shares of restricted stock units	246,155	111,250
Unvested shares of restricted stock	—	29,413
Total common stock equivalents	6,005,401	5,427,135

Application of New Accounting Standards

During 2017, the Company adopted ASU No. 2016-09, "Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting", which is intended to simplify the financial reporting of the income tax impacts of share-based compensation arrangements. The classification guidance under ASU No. 2016-09 requires the recognition of excess tax benefits from share-based compensation arrangements as a discrete item within income tax benefit rather than additional paid-in capital and the classification guidance requiring presentation of excess tax benefits from share-based compensation arrangements as an operating activity on the statement of cash flows, rather than as a financing activity.

The adoption of ASU No 2016-09 had no net tax impact on the Company's financial statements because the Company has established a valuation allowance against the entire net deferred tax asset as of December 31, 2017. The Company has adjusted the net operating loss carryforward to include the excess tax benefits that were not previously recognized offset by a full valuation allowance. Further, the Company has elected to continue to estimate the number of stock-based awards expected to vest, as permitted by ASU 2016-09, rather than electing to account for forfeitures as they occur.

In August 2016, the FASB issued ASU 2016-15, "Classification of Certain Cash Receipts and Cash Payments," which provides guidance on the classification of certain cash receipts and payments in the statement of cash flows. The pronouncement is effective for annual periods beginning after December 15, 2017, and interim periods within those annual periods. Earlier application is permitted in any interim or annual period. The Company adopted this standard in 2017, with no material effect upon its financial statements.

New Accounting Requirements and Disclosures

In February 2016, the FASB issued ASU No. 2016-02, “Leases,” which requires companies that lease assets to recognize a right-of-use asset and a lease liability, initially measured at the present value of the lease payments, in its balance sheet. The pronouncement will also require additional disclosures about the amount, timing and uncertainty of cash flows arising from leases. This pronouncement is effective for fiscal years, and interim periods within those years, beginning after December 15, 2018, and early adoption is permitted.

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ASC 842 was previously required to be adopted using the modified retrospective approach. However, in July 2018, the FASB issued ASU 2018-11, which allows for retrospective application with the recognition of a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption. Under this option, entities would not need to apply ASC 842 (along with its disclosure requirements) to the comparative prior periods presented.

ASC 842 is effective for the Company in the first quarter of 2019 and management expects that most of its operating leases (primarily office space) will be recognized as operating lease liabilities and right of use assets on its balance sheet. The Company has elected to adopt certain of the optional practical expedients, including the package of practical expedients, which, among other things, gives the option to not reassess: 1) whether expired or existing contracts are or contain leases; 2) the lease classification for expired or existing leases; and 3) initial direct costs for existing leases. Management has evaluated the impact of the adoption of this standard and expects to record right of use assets of $4.9 million and lease obligations of $6.6 million.

In 2018, the FASB issued ASU No. 2018-07, “Compensation - Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting”, which changes the measurement date for share-based awards to the grant date, instead of the previous requirement to remeasure the awards through the performance completion date. ASU No. 2018-07 is effective for the Company for fiscal years beginning after December 31, 2018, including interim periods within that fiscal year. Early adoption is permitted. The Company does not believe adopting ASU No. 2018-07 will have a material impact on its consolidated financial statements.

In 2018, the FASB issued ASU No. 2018-13, “Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement”, which modifies fair value disclosures and removes some disclosure requirements for both public and private companies. In addition, public companies are subject to some new disclosure requirements which requires to disclose the changes in unrealized gains and losses for the period included in other comprehensive income for recurring Level 3 fair value measurements held at the end of the reporting period and the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements. ASU No. 2018-13 is effective for all entities for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. Early adoption is permitted. The Company does not believe adopting ASU No. 2018-13 will have a material impact on its consolidated financial statements.

NOTE 4 - CASH, CASH EQUIVALENTS AND RESTRICTED CASH

At December 31, 2018 and 2017, the Company maintained $5.0 million and $6.2 million as restricted cash. During 2017, $4.2 million was received from the Cancer Prevention and Research Institute of Texas, or “CPRIT”, and is being held in a separate account to be used for costs solely related to the CPRIT grant. Release of the CPRIT funds are subject to the terms of the grant agreement and requirements therein and require the authorization of CPRIT. During 2018, CPRIT authorized the release of $0.8 million of restricted funds from the CPRIT account, leaving a balance of $3.4 million at December 31, 2018. For more information about the CPRIT grant, see Note 9.
The remaining $1.6 million of restricted cash as of December 31, 2018 and the $2.0 million in 2017 is held in escrow to cover specific construction of manufacturing improvement costs related to the facility lease. The release of the escrowed funds is subject to the terms of the escrow agreement and requirements therein including approval by both the Company and the landlord based on authorized completion of certain aspects of the manufacturing improvements.
The following table provides a reconciliation of cash, cash equivalents and restricted cash reported within the balance sheets that sum to the total of the same such amounts shown in the statements of cash flows.

	December 31, 2018	December 31, 2017
	(in thousands)	
Cash and cash equivalents [(1)]	$43,695	$38,839
Restricted cash, noncurrent	4,973	6,190
Total cash, cash equivalents and restricted cash shown in the statements of cash flows	$48,668	$45,029

(1) As of December 31, 2018 and 2017, the Company invested approximately $25.0 million and $25.6 million, respectively, in cash equivalent instruments.

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Notes to the Consolidated Financial Statements

NOTE 5 - FAIR VALUE OF MEASUREMENTS AND INVESTMENT SECURITIES

The Company follows ASC, Topic 820, Fair Value Measurements and Disclosures, or ASC 820, for application to financial assets. ASC 820 defines fair value, provides a consistent framework for measuring fair value under GAAP and requires fair value financial statement disclosures. ASC 820 applies only to the measurement and disclosure of financial assets that are required or permitted to be measured and reported at fair value under other ASC topics (except for standards that relate to share-based payments such as ASC Topic 718, Compensation – Stock Compensation).
The valuation techniques required by ASC 820 may be based on either observable or unobservable inputs. Observable inputs reflect readily obtainable data from independent sources, and unobservable inputs reflect the Company's market assumptions.
These inputs are classified into the following hierarchy:
Level 1 Inputs – quoted prices (unadjusted) in active markets for identical assets that the reporting entity has the ability to access at the measurement date;
Level 2 Inputs – inputs other than quoted prices included within Level 1 that are observable for the asset, either directly or indirectly; and
Level 3 Inputs – unobservable inputs for the assets.

The following tables present the Company's investment securities (including, if applicable, those classified on the Company's balance sheet as cash equivalents) that are measured at fair value on a recurring basis as of December 31, 2018 and 2017:

	Balance at December 31, 2018	Fair Value Measurements at Reporting Date Using Quoted prices in active markets for identical assets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
	(in thousands)			
Cash Equivalents:				
Money market funds	$24,953	$24,953	$ —	$ —
Total Cash Equivalents	$24,953	$24,953	$ —	$ —
Investment Securities:				
U.S. government agency-backed securities	$7,383	$ —	$ 7,383	$ —
Corporate debt securities	41,921	—	41,921	—
Total Investment Securities	$49,304	$ —	$ 49,304	$ —

	Balance at December 31, 2017	Fair Value Measurements at Reporting Date Using Quoted prices in active markets for identical	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)

		assets (Level 1)		
	(in thousands)			
Cash Equivalents:				
Money market funds	$25,550	$25,550	$ —	$ —
Total Cash Equivalents	$25,550	$25,550	$ —	$ —
Investment Securities:				
U.S. government agency-backed securities	$22,604	$—	$ 22,604	$ —
Corporate debt securities	38,821	—	38,821	—
Total Investment Securities	$61,425	$—	$ 61,425	$ —

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U.S. Treasury, U.S. government agency-backed securities, corporate debt securities and municipal bonds are valued based on various observable inputs such as benchmark yields, reported trades, broker/dealer quotes, benchmark securities and bids.

Investment securities, all classified as available-for-sale, consisted of the following as of December 31, 2018 and 2017:

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Estimated Fair Value
December 31, 2018	(in thousands)			
U.S. government agency-backed securities	$7,382	$ 2	$ (1)	$ 7,383
Corporate debt securities	41,968		(47)	41,921
Total	$49,350	$ 2	$ (48)	$ 49,304
December 31, 2017				
U.S. government agency-backed securities	$22,632	$ —	$ (28)	$ 22,604
Corporate debt securities	38,839	13	(31)	38,821
Total	$61,471	$ 13	$ (59)	$ 61,425

The Company's investment securities as of December 31, 2018, will reach maturity between January 2019 and November 2019, with a weighted-average maturity date in April 2019.

NOTE 6 - PROPERTY AND EQUIPMENT

Property and equipment consists of the following:

		December 31,	
		2018	2017
	Estimated Useful Lives	(in thousands)	
Leasehold improvements	5 Years	$21,633	$21,462
Lab equipment	5 Years	8,471	7,766
Office furniture	5 Years	1,704	1,701
Manufacturing equipment	5 Years	1,890	1,815
Computer and office equipment	3 to 5 Years	1,606	1,074
Equipment held under capital leases	5 Years	204	204
Software	3 Years	361	216
Total		35,869	34,238
Less: accumulated depreciation		(14,991)	(8,296)
Property and equipment, net		$20,878	$25,942

During the years ended December 31, 2018 and 2017, the Company recorded $6.7 million and $3.6 million of depreciation expense, respectively. Leasehold improvements at December 31, 2018 and 2017 both include $2.5 million related to costs incurred by the landlord.

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Notes to the Consolidated Financial Statements

NOTE 7 - ACCRUED EXPENSES AND OTHER CURRENT LIABILITIES

Accrued expenses and other liabilities consist of the following:

	December 31,	
	2018	2017
	(in thousands)	
Accrued payroll	$3,430	$2,682
Accrued patient treatment costs	2,053	1,392
Accrued manufacturing costs	546	370
Accrued construction costs	457	565
Accrued other	2,103	1,383
Total accrued expenses and other current liabilities	$8,589	$6,392

NOTE 8 - DEBT

Hercules Loan

On March 10, 2016 (the “Hercules Closing Date”), the Company entered into a Loan and Security Agreement (the “Hercules Loan Agreement”) with Hercules Capital, Inc., Hercules Technology II, L.P., and Hercules Technology III, L.P., or collectively, “Hercules”, as a lender, under which the Company borrowed $15.0 million. The Company borrowed an additional $5.0 million and $10.0 million on September 15, 2016 and March 8, 2017, respectively. The total debt was secured by a lien covering substantially all of the assets of the Company, excluding intellectual property, but including proceeds from the sale, license, or disposition of intellectual property. The Company paid expenses related to the loan of $0.3 million which, along with a final facility charge of $2.1 million was recorded as deferred financing costs. Interest expense for the year ended December 31, 2017 included $0.8 million of amortized deferred financing costs.

On December 21, 2017, the Company repaid the outstanding balance, accrued interest and Final Hercules Facility Charge totaling $32.9 million, which included a prepayment charge of $1.8 million with proceeds from a new loan from Oxford Finance, LLC, discussed below.

Oxford Loan

On December 21, 2017 (the “Oxford Closing Date”), the Company entered into a loan and security agreement (the “Oxford Loan Agreement”) with Oxford Finance LLC, as the collateral agent and a lender, pursuant to which the Company borrowed $35.0 million in a single term loan (the “Oxford Loan”) on the Oxford Closing Date. As discussed above, on the Oxford Closing Date, the Company used approximately $32.9 million of the proceeds from the Oxford Loan to repay its indebtedness to Hercules.

The Company’s obligations under the Oxford Loan Agreement are secured by a first priority security interest in substantially all of the Company’s current and future assets, other than its intellectual property. The Company has also agreed not to encumber its intellectual property assets, except as permitted by the Oxford Loan Agreement. The Oxford Loan matures on December 1, 2022 (the “Oxford Maturity Date”) and will be interest-only through January 31, 2020, followed by 35 equal monthly payments of principal and unpaid accrued interest. The Oxford Loan bears interest at a floating per annum rate equal to (i) 7.25% 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) 1.25%. The interest rate on amounts borrowed under the Oxford Loan Agreement was 12.09% at December 31, 2018.

The Company will be required to make a final payment of 8.70% of the principal amount of the Oxford Loan borrowed (the "Oxford Final Payment Fee"), payable on the earlier of (i) the Oxford Maturity Date, (ii) the acceleration of the Oxford Loan, or (iii) the prepayment of the Oxford Loan. The Company may 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) 3.00% of the outstanding principal balance if prepaid on or before the first anniversary of the Closing Date, (ii) 2.00% of the outstanding principal balance, if prepaid after the first anniversary and before the second anniversary of the Closing Date, and (iii) 1.00% of the outstanding principal balance prepaid thereafter and prior to the Maturity Date (each, a "Prepayment Fee"). While any amounts are outstanding under the Oxford Loan Agreement, the Company is subject to a number of affirmative and restrictive covenants, including covenants regarding delivery of financial statements, payment of taxes, maintenance of insurance, dispositions of property, business combinations or acquisitions, incurrence of additional indebtedness and transactions with affiliates, among other customary covenants. The Company is also restricted from paying dividends or making other distributions or payments of its capital stock, subject to limited exceptions. Upon the occurrence of certain

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events, including but not limited to the Company’s failure to satisfy its payment obligations under the Oxford Loan Agreement, the breach of certain of its other covenants under the Oxford Loan Agreement, or the occurrence of a material adverse change, the collateral agent will have the right, among other remedies, to declare all principal and interest immediately due and payable, and the lender will have the right to receive the Oxford Final Payment Fee and, if the payment of principal and interest is due prior to the Oxford Maturity Date, a Prepayment Fee.

The Company paid expenses related to the Oxford Loan Agreement of $0.1 million, which, along with the final facility charge of $3.0 million, have been recorded as deferred financing costs, which offset long-term debt on the Company's balance sheet. The deferred financing costs are being amortized over the term of the loan as interest expense. During the year ended December 31, 2018, interest expense included $0.9 million of amortized deferred financing costs compared to less than $22,000 for the year ended December 31, 2017.

The total gross payments due under the Company's debt arrangements are as follows:

Year	As of December 31, 2018 (in thousands)
2019	$ —
2020	11,000
2021	12,000
2022	12,000
Thereafter	3,045
Total debt	$ 38,045
Less deferred financing costs	(2,213)
Less current portion	—
Total long-term debt	$ 35,832

Management believes that the carrying value of the debt facility approximates its fair value, as the Company's debt facility bears interest at a rate that approximates prevailing market rates for instruments with similar characteristics. The fair value of the Company's debt facility is determined under Level 2 in the fair value hierarchy.

NOTE 9 - GRANT REVENUE

Cancer Research Grant Contract

On August 9, 2017, the Company entered into a Cancer Research Grant Contract (the “CPRIT Agreement”) with CPRIT, pursuant to which CPRIT awarded a grant of approximately $16.9 million to the Company to fund development of rivo-cel for hematologic cancer (the “CPRIT Award”). The CPRIT Award is contingent upon funds being available during the term of the Agreement and subject to CPRIT’s ability to perform its obligations under the Agreement.

The Company and CPRIT will retain joint ownership over any intellectual property developed under the Agreement. With respect to non-commercial use of any intellectual property developed under the CPRIT Agreement (the “CPRIT Project Results”), the Company agreed to grant to CPRIT a sublicensable, nonexclusive, irrevocable, royalty-free, perpetual worldwide license to any intellectual property of the Company that is necessary to exploit the CPRIT Project

Results. The CPRIT Agreement permits the Company to license any CPRIT Project Results, subject to the Company retaining an exclusive sublicensable license to exploit the CPRIT Project Results for non-commercial purposes.

The Company is obligated to make revenue-sharing payments to CPRIT with respect to net sales of any product covered by the Agreement, up to a maximum repayment of 400% of the aggregate amount paid to the Company by CPRIT under the CPRIT Agreement. The payments are determined as a percentage of net sales ranging from the low to mid-single digits, which may be reduced if the Company is required to obtain a license from a third party to sell any such product. In addition, upon meeting the foregoing limitation on revenue-sharing payments, the Company agreed to make continued revenue-sharing payments to CPRIT of less than 1% of net sales.

The CPRIT Agreement will expire on February 29, 2020 unless terminated earlier by: mutual consent of the parties; CPRIT upon an event of default by the Company as specified in the CPRIT Agreement; CPRIT if allocated funds become unavailable or CPRIT is unable to obtain additional funds; or the Company in its sole discretion.

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During 2017, the Company received $4.2 million in advance funding from CPRIT, which was recorded as deferred revenue. As of December 31, 2018 and 2017, the Company incurred expenses and accrued revenue of $1.1 million and $0.1 million, respectively, for work performed under the CPRIT grant.

NIH Grant

During 2013, the Company entered into a grant agreement with the NIH. The grant was a modular multi-year grant with funds being awarded each year based on the progress of the program being funded. Grant money is not received until expenses for the program are incurred. We have been awarded approximately $1.4 million to date. The grant expired March 31, 2017.

NOTE 10 - STOCKHOLDERS' EQUITY

On March 29, 2017, the Company completed an underwritten public offering of 5,750,000 shares of its common stock at a price of $12.00 per share, for an aggregate offering size of $69.0 million, pursuant to a registration statement on Form S-3. The net proceeds to the Company, after deducting underwriting discounts, and commissions and offering expenses were approximately $64.6 million. These costs have been recorded as a reduction of the proceeds received from the offering.

On April 20, 2018, the Company completed an underwritten public offering of 9,200,000 shares of its common stock at a price of $7.50 per share, for an aggregate offering size of $69.0 million, pursuant to a registration statement on Form S-3. The net proceeds to the Company, after deducting underwriting discounts, and commissions and offering expenses was approximately $64.7 million. These costs have been recorded as a reduction of the proceeds received from the offering.

On October 5, 2018, the Company entered into an Open Market Sale Agreement℠ with Jefferies LLC, as sales agent, pursuant to which the Company may offer and sell, from time to time, through Jefferies, shares of the Company’s common stock having an aggregate offering price of up to $60.0 million. The shares will be offered and sold pursuant to the Company’s shelf registration statement on Form S-3.

NOTE 11 - SHARE-BASED COMPENSATION PLANS

The Company has four share-based compensation plans, which authorize the granting of shares of common stock and options to purchase common stock to employees and directors of the Company, as well as non-employee consultants, and allows the holder of the option to purchase common stock at a stated exercise price. Options vest according to the terms of the grant, which may be immediately or based on the passage of time, generally over four years, and have a term of up to 10 years. Unexercised stock options terminate on the expiration date of the grant. The Company recognizes the share-based compensation expense over the requisite service period of the individual grantees, which generally equals the vesting period.

At December 31, 2018, the Company had share-based awards outstanding under four share-based compensation plans, as follows:

2006 Stock Option Plan

The 2006 Stock Option Plan (the “2006 Plan”) provided for the issuance of non-qualified stock options to employees, including officers, non-employee directors and consultants to the Company. As of December 31, 2018, there were 6,882 shares of common stock reserved for issuance pursuant to outstanding options granted under the 2006 Plan. The 2006 Plan was terminated by the Board in October 2014.

2011 Stock Option Plan

The 2011 Stock Option Plan (the "2011 Plan") provided for the issuance of incentive and non-qualified stock options to employees, including officers, non-employee directors and consultants to the Company. As of December 31, 2018, there were 512,015 shares of common stock reserved for issuance pursuant to outstanding options granted under the 2011 Plan. The 2011 Plan replaced the 2006 Plan. The 2011 Plan terminated upon the effectiveness of the 2014 Plan described below.

2014 Equity Incentive Plan

The 2014 Equity Incentive Plan (the "2014 Plan") became effective in December 2014, upon the closing of the IPO. The 2014 Plan provides for the issuance of equity awards, including incentive and non-qualified stock options and restricted stock awards to

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employees, including officers, non-employee directors and consultants to the Company or its affiliates. The 2014 Plan also provides for the grant of performance cash awards and performance-based stock awards.

On June 14, 2017, the stockholders approved an amendment to the 2014 Plan to, among other things, increase the number of shares of common stock authorized for issuance under the 2014 Plan by 3,100,000 shares and eliminate the prior provision in the 2014 Plan that allowed the Company's Board of Directors to reprice stock options without stockholder approval.

The aggregate number of shares of common stock that are authorized for issuance under the 2014 Plan is 6,090,354 shares, plus any shares subject to outstanding options that were granted under the 2011 Plan or 2006 Plan that are forfeited, terminated, expired or are otherwise not issued. As of December 31, 2018, there were 5,486,504 outstanding awards, comprised of 4,015,349 options, 1,225,000 inducement option awards, 194,905 restricted stock units and 51,250 inducement restricted stock units. At December 31, 2017, there were 3,646,113 outstanding awards, comprised 2,875,450 options, 630,000 inducement option awards, 96,250 restricted stock units, 29,413 shares of restricted stock and 15,000 inducement restricted stock units outstanding. As of December 31, 2018, there were 2,059,399 shares remaining to be issued under 2014 Plan.

2014 Employee Stock Purchase Plan

The 2014 Employee Stock Purchase Plan (the "ESPP") provides for eligible Company employees, as defined by the ESPP, to be given an opportunity to purchase the Company's common stock at a discount, through payroll deductions, with stock purchases being made upon defined purchase dates. The ESPP authorizes the issuance of up to 550,000 shares of the Company's common stock to participating employees, and allows eligible employees to purchase shares of common stock at a 15% discount from the grant date fair market value. During the year ended December 31, 2018 and 2017, 45,390 and 34,654 shares were purchased under the ESPP.
As of December 31, 2018, there were 414,637 shares remaining to be issued.

A summary of activity within the ESPP follows:

	Year Ended December 31,	
	2018	2017
	(amounts in thousands, except per share)	
Deductions from employees	$221	$276
Share-based compensation expense recognized	$138	$225
Remaining share-based compensation expense	$464	$264
Proceeds received by the Company for ESPP	$205	$293
Weighted-average purchase price per common share	$4.53	$8.43
Number of shares purchased by employees under ESPP	45,390	34,654

Share-Based Compensation Expense
The valuation of the share-based compensation awards is a significant accounting estimate that requires the use of judgment and assumptions that are likely to have a material impact on the financial statements. The fair value of option grants is determined using the Black-Scholes option-pricing model. Expected volatilities utilized in the model are based on the Company's historical trading volatility. Similarly, the dividend yield is based on historical experience and the estimate of future dividend yields. The risk-free interest rate is derived from the U.S. Treasury yield curve in

effect at the time of grant. The expected term of the options is based on the average period the stock options are expected to remain outstanding. As the Company does not have sufficient historical information to develop reasonable expectations about future exercise patterns and post-vesting employment termination behavior, the expected term is calculated as the midpoint between the weighted-average vesting term and the contractual expiration period also known as the simplified method.

The fair values of the option grants have been estimated, with the following weighted-average assumptions:

	Year Ended December 31,	
	2018	2017
Risk-free interest rate	2.67%	2.06%
Volatility	72 %	72 %
Expected life (years)	6.08	6.08
Expected dividend yield	0 %	0 %

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Share-based compensation for the years ended December 31, 2018 and 2017, are as follows:

	Year Ended December 31,	
	2018	2017
	(in thousands)	
General and administrative	$7,479	$7,128
Research and development	6,345	6,441
Total	$13,824	$13,569

Stock option activity for the years ended December 31, 2018 and 2017 is as follows:

Options	Outstanding Stock Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value[1] (in thousands)
Balance at December 31, 2016	4,532,120	$ 12.37	7.58	$ 20,453
Granted	1,504,625	$ 11.67		
Exercised	(344,958)	$ 4.31		$ —
Forfeited	(405,315)	$ 16.97		
Balance at December 31, 2017	5,286,472	$ 12.35	7.35	$ 7,223
Granted[2]	2,623,191	$ 6.88		
Exercised	(1,044,450)	$ 3.20		
Forfeited	(1,105,967)	$ 15.56		
Balance at December 31, 2018	5,759,246	$ 10.90	8.09	$ 87
Exercisable as of December 31, 2018	2,447,034	$ 14.28	6.73	$ 87

[1] The aggregate intrinsic value as of December 31, 2018, is calculated as the difference between the exercise price of the underlying options and the estimated fair value of the common stock for the options that were in the money at December 31, 2018.
[2] Includes 595,000 of inducement option awards granted in 2018.

The following table summarizes the stock award activity for all stock plans during the year ended December 31, 2018 and 2017:

Restricted Stock Shares	Outstanding Restricted Stock Awards and Units	Outstanding Aggregate Intrinsic Value (1) (in thousands)
Balance at December 31, 2016	58,825	$ 801
Granted	117,500	
Vested	(29,412)	330
Forfeited	(6,250)	
Balance at December 31, 2017[2]	140,663	$ 1,183
Granted[3]	211,250	
Vested	(57,227)	420

Forfeited	(48,531)	
Balance at December 31, 2018[(2)]	246,155	$ 719

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(1) The aggregate intrinsic value as of December 31, 2018, is calculated as the fair value of restricted stock and restricted stock units at December 31, 2018.
(2) At December 31, 2018, there were no shares of unvested restricted common stock outstanding, compared with 29,413 shares outstanding at December 31, 2017.
(3) Includes 40,000 of inducement restricted stock units granted during 2018.

The following table includes share-based payment activity for the years ended December 31, 2018 and 2017:

	Year Ended December 31,	
	2018	2017
	(in thousands, except per share)	
Weighted-average grant date fair value of options granted	$4.51	$7.55
Weighted-average grant date fair value of restricted stock units granted	$7.14	$12.59
Total fair value of restricted shares vested	$907	$330
Cash received by Company upon option exercises	$3,270	$1,486

The following table summarizes the options outstanding and exercisable at December 31, 2018:

Options Outstanding				Options Exercisable		
Exercise Price	Total Shares	Weighted- Average Remaining Contractual Term (in years)	Weighted-Average Exercise Price	Total Shares	Weighted- Average Remaining Contractual Term (in years)	Weighted-Average Exercise Price
$0.51 to $6.17	1,154,806	8.59	$ 4.21	197,806	3.14	$ 2.48
$6.18 to $7.84	1,267,975	8.38	$ 7.53	373,146	6.25	$ 7.48
$7.85 to $11.76	1,206,985	8.66	$ 9.87	326,720	8.03	$ 10.85
$11.77 to $18.24	1,010,001	7.80	$ 12.88	571,090	7.66	$ 13.05
$18.25 to $24.48	1,119,479	5.49	$ 20.95	978,272	5.32	$ 21.12
Total	5,759,246	8.09	$ 10.90	2,447,034	6.73	$ 14.28

At December 31, 2018, total compensation cost not yet recognized was $16.3 million and the weighted average period over which this amount is expected to be recognized is 2.51 years. The aggregate fair value of options and restricted shares vesting in the years ended December 31, 2018 and 2017 was $13.9 million and $12.2 million, respectively.

NOTE 12 - COMMITMENTS AND CONTINGENCIES

Operating Lease Agreements
The Company leases its office and manufacturing facilities under non-cancelable operating leases that expire January 31, 2020 and August 31, 2026, respectively. Rent expense for non-cancelable operating leases with scheduled rent

increases is recognized on a straight-line basis over the terms of the leases. Improvement reimbursements from the landlord of $2.5 million are being amortized on a straight-line basis into rent expense over the terms of the leases. The difference between required lease payments and rent expense has been recorded as deferred rent. Rent expense was $2.1 million in 2018 and $2.1 million in 2017. Deferred rent was $1.7 million as of December 31, 2018 and $2.0 million as of December 31, 2017.

Escrow agreement related to the construction of the Company's manufacturing facility

Pursuant to the escrow agreements related to the Company's lease dated May 2015, the Company agreed to deposit into escrow a total of approximately $11.0 million, which represents 110% of the Company’s then-remaining share of the estimated build-out costs. The

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funds were deposited into an escrow account in December 2016 and reported as restricted cash. The escrow balance in restricted cash as of December 31, 2018 and 2017 was $1.6 million and 2.0 million, respectively.

Capital Lease Agreements - Equipment

The Company entered into multiple office equipment leases during both 2016 and 2015, which expire in 2021. The office equipment leases are being accounted for as capital leases under FASB Topic ASC 840 - Leases. The present value of the minimum lease payments is greater than 90% or more than the fair market value of the leased equipment and the lease terms are 6 years or the remaining term of the lease.

Aggregate future minimum annual payments under operating and capital leases at December 31, 2018, are as follows:

Year	Operating Leases	Capital Leases
	(in thousands)	
2019	$2,087	$ 68
2020	1,112	68
2021	1,055	43
2022	1,094	—
2023	1,133	—
Thereafter	3,222	—
Total minimum rentals	$9,703	$ 179

Co-Development and Co-Commercialization Agreement - Adaptimmune Therapeutics plc
On December 16, 2016, the Company entered into a Co-Development and Co-Commercialization Agreement with and Adaptimmune Therapeutics plc (Adaptimmune) in order to facilitate a staged collaboration to evaluate, develop and commercialize next generation T cell therapies. Under the Agreement, the parties agreed to evaluate the Company’s GoTCR technology (inducible MyD88/CD40 co-stimulation, or iMC) with Adaptimmune’s affinity-optimized SPEAR® T cells for the potential to create enhanced TCR product candidates. Depending on results of the preclinical proof-of-concept phase, the parties expect to progress to a two-target co-development and co-commercialization phase. To the extent necessary, and in furtherance of the parties’ proof-of-concept and co-development efforts, the parties granted each other a royalty-free, non-transferable, non-exclusive license covering their respective technologies for purposes of facilitating such proof-of-concept and co-development efforts. In addition, as to covered therapies developed under the agreement, the parties granted each other a reciprocal exclusive license for the commercialization of such therapies. With respect to any joint commercialization of a covered therapy, the parties agreed to negotiate in good faith the commercially reasonable terms of a co-commercialization agreement. The parties also agreed that any such agreement shall provide for, among other things, equal sharing of the costs of any such joint commercialization and the calculation of profit shares as set forth in the Agreement. The Agreement will expire on a country-by-country basis once the parties cease commercialization of the T cell therapies covered by the Agreement, unless earlier terminated by either party for material breach, non-performance or cessation of development, bankruptcy/insolvency, or failure to progress to co-development phase. There were no expenses recognized under the Adaptimmune agreement for the years ended December 31, 2018 and 2017.

Collaboration Agreement - OPBG

In October 2016, the Company entered into a collaboration agreement with Ospedale Pediatrico Bambino Gesú ("OPBG"), pursuant to which the Company and OPBG agreed to collaborate on research projects and early stage clinical trials for the design and development of various T cell immunotherapies. As consideration for OPBG's performance of the research under the agreement and grant of certain licenses to the Company, the Company agreed to fund an aggregate of up to $4.7 million in project costs payable to OPBG or certain third-party service providers, as applicable, over the term of the research, estimated to be 4 years. With respect to any inventions arising from the research, OPBG agreed to grant the Company an exclusive license to any such inventions, the terms of which will be set forth in a separate agreement. In addition, OPBG granted the Company paid-up, worldwide co-exclusive licenses for non-commercial development of OPBG's CD19 and GD2 CAR T technologies, as well as paid-up, worldwide exclusive licenses to commercialize its CD19 and GD2 CAR T technologies, each to be governed by a separate agreement. The expenses recognized under the OPBG Collaboration Agreement were $0.6 million and $0.7 million for the years ended December 31, 2018 and 2017, respectively. The collaboration agreement with OPBG expired on December 31, 2018.

Collaboration Agreement - Leiden

In May 2016, the Company and Academisch Ziekenhuis Leiden ("Leiden") entered into a research collaboration agreement pursuant to which the Company will provide Leiden with financial support for research to discover and validate high-affinity TCR product candidates targeting several cancer-associated antigens. The Company agreed to pay Leiden an aggregate of EURO 2.5 million in quarterly installments during the three-year term of the research, which will be recognized as services are incurred. With respect to any inventions arising from the research that are relevant to or useful for any high affinity TCR that is studied in the research, Leiden granted the Company an exclusive option to obtain an exclusive, worldwide license to practice and exploit such inventions. The parties agreed to negotiate in good faith the commercially reasonable terms of each such license agreement entered into between the parties, based on terms similar to those set forth in the previously executed license agreement between the parties and those specified in the agreement. The expenses recognized under the Leiden license agreement were $1.1 million for each of the years ended December 31, 2018 and 2017, respectively.

License Agreement - Baylor

In March 2016, the Company and Baylor College of Medicine ("BCM") entered into two additional license agreements pursuant to which the Company obtained exclusive rights to technologies and patent rights owned by BCM. The Company paid BCM a nonrefundable license fee of $0.1 million and could incur additional payments upon the achievement of certain milestone events as set forth in the agreement. If the Company is successful in developing any of the licensed technologies, resulting sales would be subject to a royalty payment in the low single digits. During each of the years ended December 31, 2018 and 2017, $22,500 was recognized under Baylor License Agreement.

License Agreement - Agensys, Inc.

On December 10, 2015, the Company and Agensys, Inc. ("Agensys"), entered into a license agreement (the "Agensys Agreement"), pursuant to which (i) Agensys granted the Company, within the field of cell and gene therapy of diseases in humans, an exclusive, worldwide license and sublicense to its patent rights directed to prostate stem cell antigen 1 ("PSCA") and related antibodies, and (ii) the Company granted Agensys a non-exclusive, fully paid license to the Company's patents directed to inventions that were made by the Company in the course of developing the Company's licensed products, solely for use with Agensys therapeutic products containing a soluble antibody that binds to PSCA or, to the extent not based upon the Company's other proprietary technology, to non-therapeutic applications of antibodies not used within the field. As consideration for the rights granted to the Company under the Agreement, the Company agreed to pay to Agensys a non-refundable upfront fee of $3,000,000, which was included in license fee expense. The Company is also required to make aggregate milestone payments to Agensys of up to (i) $5,000,000 upon the first achievement of certain specified clinical milestones for its licensed products, (ii) $50,000,000 upon the achievement of certain specified clinical milestones for each licensed product, and (iii) $75,000,000 upon the achievement of certain sales milestones for each licensed product. The Agreement additionally provides that the Company will pay to Agensys a royalty that ranges from the mid to high single digits based on the level of annual net sales of licensed products by the Company, its affiliates or permitted sublicensees. The royalty payments are subject to reduction under specified circumstances. These milestone and royalty payments will be expensed as incurred. Under the Agreement, Agensys also was granted the option to obtain an exclusive license, on a product-by-product basis, from the Company to commercialize in Japan each licensed product developed under the Agensys Agreement that has completed a phase 2 clinical trial. As to each such licensed product, if Agensys or its affiliate, Astellas Pharma, Inc., exercises the option, the Agensys Agreement provides that the Company will be paid an option exercise fee of $5,000,000. In addition, the Agensys Agreement provides that the Company will be paid a royalty that ranges from the mid to high single digits based on the level of annual net sales in Japan of each

such licensed product. If the option is exercised, the aggregate milestone payments payable by the Company to Agensys, described above with respect to each licensed product, would be reduced by up to an aggregate of $65,000,000 upon the achievement of certain specified clinical and sales milestones. The Agensys Agreement will terminate upon the expiration of the last royalty term for the products covered by the Agensys Agreement, which is the earlier of (i) the date of expiration or abandonment of the last valid claim within the licensed patent rights covering any licensed products under the Agreement, (ii) the expiration of regulatory exclusivity as to a licensed product, and (iii) 10 years after the first commercial sale of a licensed product. Either party may terminate the Agensys Agreement upon a material breach by the other party that remains uncured following 60 days after the date of written notice of such breach (or 30 days if such material breach is related to failure to make payment of amounts due under the Agensys Agreement) or upon certain insolvency events. In addition, Agensys may terminate the Agensys Agreement immediately upon written notice to the Company if the Company or any of its affiliates or permitted sublicensees commences an interference proceeding or challenges the validity or enforceability of any of Agensys' patent rights. There were no expenses recognized under the Agensys Agreement for the years ended December 31, 2018 and 2017.

License Agreement - BioVec

On June 10, 2015, the Company and BioVec Pharma, Inc. ("BioVec") entered into a license agreement (the "BioVec Agreement") pursuant to which BioVec agreed to supply the Company with certain proprietary cell lines and granted to the Company a non-

exclusive, worldwide license to certain of its patent rights and related know-how related to such proprietary cell lines. As consideration for the products supplied and rights granted to the Company under the BioVec Agreement, the Company agreed to pay to BioVec an upfront fee of $100,000 within ten business days of the effective date of the BioVec Agreement and a fee of $300,000 within ten business days of its receipt of the first release of GMP lot of the products licensed under the BioVec Agreement. In addition, the Company agreed to pay to BioVec an annual fee of $150,000, commencing 30 days following the first filing of an Investigational New Drug Application (an IND filing), or its foreign equivalent, for a product covered by the license; with such annual fees being creditable against any royalties payable by the Company to BioVec under the BioVec Agreement. The Company also is required to make a $250,000 milestone payment to BioVec for each of the first three licensed products to enter into a clinical phase trial and one-time milestone payments of $2,000,000 upon receipt of a registration granted by the Federal Drug Administration or European Medicines Agency on each of the Company's first three licensed products. The BioVec Agreement additionally provides that the Company will pay to BioVec a royalty in the low single digits on net sales of products covered by the BioVec Agreement. The Company may also grant sublicenses under the licensed patent rights and know-how to third parties for limited purposes related to the use, sale and other exploitation of the products licensed under the BioVec Agreement. The BioVec Agreement will continue until terminated. The BioVec Agreement may be terminated by the Company, in its sole discretion, at any time upon 90 days written notice to BioVec. Either party may terminate the BioVec Agreement in the event of a breach by the other party of any material provision of the BioVec Agreement that remains uncured on the date that is 60 days after written notice of such failure or upon certain insolvency events that remain uncured following the date that is 30 days after the date of written notice to a party regarding such insolvency event. The Company recognized expenses of $0.2 million and $0.7 million, in connection with the BioVec License Agreement for the years ended December 31, 2018 and 2017, respectively.

License Agreement - Leiden

On April 23, 2015, the Company and Academisch Ziekenhuis Leiden, also acting under the name Leiden University Medical Centre (Leiden), entered into a license agreement (the Leiden Agreement), pursuant to which Leiden granted to the Company an exclusive, worldwide license to its patent rights covering high affinity T-cell receptors targeting preferentially-expressed antigen in melanoma, (PRAME) and POU2AF1 epitopes. The license granted under the Leiden Agreement is subject to certain restrictions and to Leiden's retained right to use the licensed patents solely for academic research and teaching purposes, including research collaborations by Leiden with academic, non-profit research third parties; provided that Leiden provides 30 days advance written notice to the Company of such academic research collaborations. As consideration for the rights granted to the Company under the Leiden Agreement, the Company agreed to pay to Leiden an aggregate of EUR 0.1 million in upfront fees within 30 days of the effective date of the Leiden Agreement. In addition, the Company agreed to pay to Leiden, beginning on the eighth anniversary of the effective date of the Leiden Agreement, annual minimum royalty payments of EUR 30.0 thousand. The Company also is required to make milestone payments to Leiden of up to an aggregate of EUR 1.0 million for each of the first licensed product that is specific to PRAME and to POU2AF1. The Leiden Agreement additionally provides that the Company will pay to Leiden a royalty in the low single digits on net sales of products covered by the Leiden Agreement. If the Company enters into a sublicensing agreement with a third party related to a product covered by the Leiden Agreement, the Company agreed to pay Leiden a percentage ranging in the low double digits on all non-royalty income received from sublicensing revenue directly attributable to the sublicense, dependent on whether the Company is in phase 1/2, phase 2 or phase 3 at the time that the Company enters into any such sublicensing agreement. Under the Leiden Agreement, the Company and Leiden entered into a sponsored research agreement, pursuant to which the Company is required to pay Leiden up to EUR 0.3 million over a three year period during the term of the sponsored research agreement. The Leiden Agreement will expire upon the expiration of the last patent included in the licensed patent rights. The Leiden Agreement may be terminated earlier upon mutual written

agreement between the Company and Leiden, and at any time by the Company upon six months written notice to Leiden. Leiden may terminate the Leiden Agreement in the event of a failure by the Company to pay any amounts due under the Leiden Agreement that remains uncured on the date that is 30 days after written notice of such failure. Either party may terminate the Leiden Agreement upon a material breach by the other party that remains uncured following 30 days after the date of written notice of such breach or upon certain insolvency events that remain uncured following the date that is 45 days after the date of written notice to a party of such insolvency event. The Company paid milestone payments under the Leiden Agreement of $0.1 million in each of the years ended December 31, 2018 and 2017, respectively.

Employment agreements

The Company has signed agreements with 20 of its officers and key employees to provide certain benefits in the event of a “change of control” as defined in these agreements and the occurrence of certain other events. The agreements provide for continued base salary payments for 3 to 18 months and a lump-sum annual cash bonus. The continued base salary and annual cash bonus portion of the agreements would aggregate approximately $6.7 million and $4.8 million at the rate of compensation in effect at December 31, 2018 and 2017, respectively. In addition, the agreements provide for continuation of certain insurance and other benefits for periods of 3 to 18 months.

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Litigation

On February 6, 2018, a purported securities class action complaint captioned Nipun Kakkar v. Bellicum Pharmaceuticals, Inc., Rick Fair and Alan Musso was filed against the Company, and certain of its officers in the U.S. District Court for the Southern District of Texas, Houston Division. A second substantially similar class action was filed on March 14, 2018 by plaintiff Frances Rudy against the same defendants in the same court. The lawsuits purport to assert class action claims on behalf of purchasers of the Company's securities during the period from May 8, 2017 through January 30, 2018. The complaints allege that the defendants violated the Securities Exchange Act of 1934, as amended (the "Exchange Act"), by making materially false and misleading statements concerning the Company's clinical trials being conducted in the U.S. to assess rivo-cel (rivogenlecleucel, formerly known as BPX-501) as an adjunct T-cell therapy administered after allogeneic hematopoietic stem cell transplantation. The complaints purport to assert claims for violations of Sections 10(b) and 20(a) of the Exchange Act and Rule 10b-5 promulgated thereunder. The complaints seek, on behalf of the purported class, an unspecified amount of monetary damages, interest, fees and expenses of attorneys and experts, and other relief. On April 9, 2018, the District Court consolidated the two lawsuits under the Kakkar action and motions were filed by putative class members for appointment as lead plaintiff and approval of lead counsel.

On July 19, 2018, a purported shareholder derivative complaint captioned Seung Paik v. Richard A. Fair, et al. was filed against the Company’s directors and certain of the Company’s officers in the U.S. District Court for the Southern District of Texas, Houston Division. The lawsuit purports to seek damages on behalf of the Company against the individual defendants for breach of fiduciary duty, waste, unjust enrichment and violations of Section 14(a) of the Exchange Act. The complaint alleges that the defendants caused or allowed the Company to disseminate misstatements regarding the clinical trials for rivo-cel and to make false or misleading statements in the proxy materials for the Company’s 2017 annual meeting of stockholders. On October 3, 2018, the District Court granted the Company’s motion to stay the derivative cause of action until reinstated on motion of the parties.

The District Court conducted a status hearing on February 21, 2019 to hear arguments on competing motions from putative class members for appointment as lead plaintiff. The Court has yet to rule on the motions.

NOTE 13 - INCOME TAXES

On December 22, 2017, the U.S. government enacted the Tax Cuts and Jobs Act. The Tax Cuts and Jobs Act significantly revised how U.S. taxes corporations.

The provisions of the Tax Cuts and Jobs Act that impacted the Company include, but are not limited to, (1) lowered the U. S. corporate income tax rate from 35% to 21%, (2) limitations on the maximum deduction for net operating loss (NOL) carryforwards generated in tax years beginning after December 31, 2017, to 80 percent of a taxpayer’s taxable income and (3) elimination of certain business expenditures. In conjunction with the Tax Cuts and Jobs Act, the SEC staff issued SAB 118, which allowed companies to record provisional amounts during a measurement period not to extend beyond one year of the enactment date. The Company previously reported provisional amounts of the income tax effects of the Tax Cuts and Jobs Act t for which the accounting was incomplete, but a reasonable estimate could be determined. During the year ended December 31, 2018, our accounting for the income tax effects of the Tax Cuts and Jobs Act was completed without material changes to the previously provided estimates.

The Company accounts for uncertain tax positions in accordance with the provisions of ASC 740, Income Taxes. When uncertain tax positions exist, the Company recognizes the tax benefit of tax positions to the extent that the benefit will more likely than not be realized. The determination as to whether the tax benefit will more likely than not be realized is based upon the technical merits of the tax position as well as consideration of the available facts and circumstances. As of December 31, 2018 and 2017, the Company had no uncertain tax positions and no interest or penalties have been charged to the Company for the years ended December 31, 2018 and 2017. If incurred, the

Company will classify any interest and penalties as a component of interest expense and operating expense, respectively. The Company is subject to routine audits by taxing jurisdictions; however, there are currently no audits for any tax periods in progress. The tax years 2005 through 2018 remain open to examination by the Internal Revenue Service.

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The reconciliation between federal income taxes at the statutory rate and the Company's income tax expense for the year is as follows:

	December 31,	
	2018	2017
	(in thousands)	
Tax benefit at statutory rate	$(20,608)	$(31,204)
Stock options	730	860
Other	128	(36)
U.S. tax reform rate change	—	37,848
Stock based compensation	1,483	333
Deferred tax valuation allowances	21,606	(1,824)
Research and development credit	(3,339)	(5,977)
Income tax expense	$—	$—

Deferred income taxes reflect the net tax effect of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes, and the amounts used for income tax purposes. Significant components of the Company's deferred taxes as of December 31, 2018 and 2017 are as follows:

	December 31,	
	2018	2017
	(in thousands)	
Deferred tax assets:		
Federal net operating loss carryforward	$63,624	$46,772
Stock compensation	4,533	4,900
Intangible assets	8,392	8,820
Research and development credit	13,612	10,273
Other	2,858	648
Total deferred tax assets	93,019	71,413
Valuation allowance	(93,019)	(71,413)
Net deferred tax assets	$—	$—

As of December 31, 2018 and 2017, the Company had gross U.S. federal income tax net operating loss (NOL) carryforwards of $303.0 million and $221.2 million, respectively and as of December 31, 2018, the Company had $2.4 million of U.K. net operating loss carryforwards. As of December 31, 2018 and 2017, the Company had U.S. federal research tax credits of $8.9 million and $6.7 million, respectively and Texas research tax credits of $4.7 million and $3.6 million, respectively. $81.8 million of the U.S. federal net operating loss carryovers have no expiration date and the remaining begin to expire in 2025. The foreign net operating loss carryovers have no expiration date. The U.S. Federal and state research credits will begin to expire in 2028 and 2034 respectively.

The Internal Revenue Code Section 382 limits NOL and tax credit carry forwards when an ownership change of more than 50% of the value of the stock in a loss corporation occurs. Accordingly, the ability to utilize remaining NOL and tax credit carryforwards may be significantly restricted.

In assessing the realization of deferred tax assets, management considers whether it is more likely than not that some portion or all of the deferred tax asset will be realized. The ultimate realization of deferred tax assets is dependent upon the Company attaining future taxable income during periods in which those temporary differences become deductible.

Due to the uncertainty surrounding the realization of the benefits of its deferred assets, including NOL carryforwards, the Company has provided a 100% valuation allowance on its deferred tax assets at December 31, 2018 and 2017. The changes in the valuation allowance were an increase of $21.6 million and a decrease of $1.8 million for the years ended December 31, 2018 and 2017, respectively.

NOTE 14 - SELECTED QUARTERLY FINANCIAL DATA (UNAUDITED)

Selected quarterly financial data (unaudited) for the year ended December 31, 2018 and 2017 is presented below:

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	(in thousands except per share data)			
2018	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Total revenues	$154	$362	$292	$312
Loss from operations	$(22,104)	$(23,567)	$(23,228)	$(26,567)
Net loss	$(22,840)	$(24,175)	$(23,801)	$(27,220)
Net loss per share attributable to common shareholders - basic and diluted	$(0.68)	$(0.60)	$(0.55)	$(0.63)

2017	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Total revenues	$128	$—	$126	$(69)[1]
Loss from operations	$(21,449)	$(23,788)	$(22,705)	$(19,445)
Net loss	$(21,973)	$(24,457)	$(23,431)	$(21,918)
Net loss per share attributable to common shareholders - basic and diluted	$(0.80)	$(0.74)	$(0.71)	$(0.66)

[1] Reversal of reimbursable expenses for CPRIT grant.

NOTE 15 - SUBSEQUENT EVENTS

On February 28, 2019 the Company entered into a sublease agreement with CBR Systems, Inc. to lease an aggregate of 13,943 square feet commencing on March 1, 2019 for 41 months. The Company is required to remit monthly base rent of approximately $43,223 commencing on May 1, 2019 which will increase by an average approximate rate of 3% each year.

The Company evaluated this lease for accounting treatment under ASC 842 - leases and determined that the lease is an operating lease.

ITEM 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

ITEM 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer and Vice President of Finance (our principal executive officer, principal financial officer and Principal Accounting Officer, respectively), evaluated the effectiveness of our disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, as of December 31, 2018. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company’s management, including its principal executive and principal financial officers, as appropriate, to allow timely decisions regarding required disclosure.

Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of December 31, 2018, our

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Chief Executive Officer, Chief Financial Officer and Vice President of Finance concluded that, as of such date, our disclosure controls and procedures were effective.

Management's Annual Report on Internal Controls over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f). Our internal control over financial reporting is designed under the supervision of our Chief Executive Officer, Chief Financial Officer and Vice President of Finance to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with United States generally accepted accounting principles.

Management, including our Chief Executive Officer and Chief Financial Officer and Vice President of Finance, has assessed the effectiveness of our internal control over financial reporting based on the framework set forth by the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control-Integrated Framework. Based on our evaluation, management has concluded that our internal control over financial reporting was effective as of December 31, 2018.

This Annual Report does not include an attestation report of our registered public accounting firm due to a transition period established by the JOBS Act applicable to emerging growth companies.

Inherent Limitations of Internal Controls

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risks that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during our latest fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. Other Information

None.

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PART III

ITEM 10. Directors, Executive Officers and Corporate Governance

The information required by this item and not set forth below will be set forth in the sections headed “Election of Directors,” “Executive Officers” and “Section 16(a) Beneficial Ownership Reporting Compliance” in our definitive proxy statement for our 2018 Annual Meeting of Stockholders, or our Proxy Statement, to be filed with the SEC within 120 days after the end of the fiscal year ended December 31, 2018, and is incorporated herein by reference.

We have adopted a written code of business conduct and ethics that applies to our directors, officers and employees, including our principal executive officer, principal financial and accounting officer or controller, or persons performing similar functions, known as the Code of Business Conduct and Ethics. The Code of Business Conduct and Ethics is available on our website at www.bellicum.com under the Corporate Governance section of our Investors & Media page. If we make any substantive amendments to, or grant any waivers from, the code of business conduct and ethics for any officer or director, we will disclose the nature of such amendment or waiver on our website or in a current report on Form 8-K.

ITEM 11. Executive Compensation

The information required by this item will be set forth in the section headed “Executive and Director Compensation” in our Proxy Statement and is incorporated herein by reference.

ITEM 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this item will be set forth in the section headed “Equity Benefit Plans” and “Security Ownership of Certain Beneficial Owners and Management” in our Proxy Statement and is incorporated herein by reference.

The information required by Item 201(d) of Regulation S-K will be set forth in the section headed “Executive and Director Compensation” in our Proxy Statement and is incorporated herein by reference.

ITEM 13. Certain Relationships and Related Party Transactions, and Director Independence

The information required by this item will be set forth in the sections headed “Certain Relationships and Related Party Transactions” and “Election of Directors” in our Proxy Statement and is incorporated herein by reference.

ITEM 14. Principal Accounting Fees and Services

The information required by this item will be set forth in the section headed “Principal Accounting Fees and Services” in our Proxy Statement and is incorporated herein by reference.

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PART IV

ITEM 15. Exhibits, Financial Statements and Schedules

(a)(1) Financial Statements.

The response to this portion of Item 15 is set forth under Part II, Item 8 above.

(a)(2) Financial Statement Schedules.

We have omitted these schedules because they are not required, or are not applicable, or the required information is shown in the consolidated financial statements or notes thereto.

(a)(3) Exhibits.

Exhibit Number	Description
3.1	Amended and Restated Certificate of Incorporation of the Registrant (incorporated by reference to Exhibit 3.1 to the Registrant's report on Form 8-K, filed with the SEC on December 23, 2014).
3.2	Amended and Restated Bylaws of the Registrant (incorporated by reference to Exhibit 3.2 to the Registrant's Current Report on Form 8-K, filed with the SEC on December 23, 2014).
4.1	Reference is made to Exhibits 3.1 and 3.2.
4.2	Form of Common Stock Certificate of the Registrant (incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
4.3	Second Amended and Restated Investor Rights Agreement by and among the Registrant and certain of its stockholders, dated August 22, 2014 (incorporated by reference to Exhibit 4.2 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
4.4	Registration Rights Agreement by and among the Registrant and Baker Brothers Life Sciences, LP, and two of its affiliated funds, dated January 15, 2016 (incorporated by reference to Exhibit 4.3 to Registrant's Registration Statement on Form S-3 (File No. 333-209012), filed with the SEC on January 15, 2016).
10.1+	Form of Indemnification Agreement by and between the Registrant and its directors and officers (incorporated by reference to Exhibit 10.1 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.2+	Bellicum Pharmaceuticals, Inc. 2006 Stock Option Plan and Form of Nonqualified Stock Option Agreement (incorporated by reference to Exhibit 10.2 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.3+	Bellicum Pharmaceuticals, Inc. 2011 Stock Option Plan and Forms of Incentive Stock Option Grant Agreement and Nonqualified Stock Option Agreement (incorporated by reference to Exhibit 10.3 to the Registrant's Registration

Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).

10.4(A)+ Bellicum Pharmaceuticals, Inc. 2014 Equity Incentive Plan, as amended.

10.4(B)+ Form of Stock Option Grant Notice and Option Agreement under the 2014 Equity Incentive Plan (incorporated by reference to Exhibit 10.4(B) to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).

10.4(C)+ Form of Stock Option Grant Notice and Option Agreement under the 2014 Equity Incentive Plan (with accelerated vesting) (incorporated by reference to Exhibit 10.4(C) to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).

10.4(D)+ Form of Restricted Stock Award Notice and Restricted Stock Award Agreement under the 2014 Equity Incentive Plan (incorporated by reference to Exhibit 10.4(D) to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).

10.4(E)+ Form of Restricted Stock Unit Notice and Restricted Stock Unit Agreement under the 2014 Equity Incentive Plan (incorporated by reference to Exhibit 10.4(E) to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).

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Exhibit Number	Description
10.4(F)+	Form of Stock Option Grant Notice and Option Agreement under the 2014 Equity Incentive Plan (Inducement Award) (incorporated by reference to Exhibit 10.4(F) to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).
10.4(G)+	Form of Stock Option Grant Notice and Option Agreement under the 2014 Equity Incentive Plan (Non-Employee Director Form) (incorporated by reference to Exhibit 10.4(G) to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).
10.5+	Bellicum Pharmaceuticals, Inc. Non-Employee Director Compensation Policy.
10.6+	Incentive Award Program (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed with the SEC on February 27, 2015).
10.7+	Incentive Award Program, as amended on February 19, 2018 (incorporated by reference to Exhibit 10.7 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).
10.8+	Letter Agreement by and between the Registrant and Richard A. Fair, dated January 25, 2017 (incorporated by reference to Exhibit 10.43 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2017).
10.9+	Amended and Restated Employment Agreement, by and between the registrant and Alan K. Smith, Ph.D., effective May 10, 2017 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on August 8, 2017).
10.10+	Employment Agreement by and between registrant and Gregory Naeve, effective July 27, 2017 (incorporated by reference to Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on November 7, 2017).
10.11+	Employment Agreement by and between registrant and William Grossman, effective February 5, 2018 (incorporated by reference to Exhibit 10.14 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).
10.12+	Separation Agreement by and between Registrant and Alan Musso, dated July 13, 2018 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on August 7, 2018).
10.13+	Retention Agreement by and between Registrant and Rosemary Williams, dated July 17, 2018 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on August 7, 2018).
10.14+	Employment Agreement by and between Registrant and Rosemary Williams, effective January 1, 2017.
10.15+	Employment Agreement by and between Registrant and Shane M. Ward, effective May 29, 2018 (incorporated by reference to Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on August 7, 2018).

10.16+	Employment Agreement by and between Registrant and Atabak Mokari, effective November 19, 2018.
10.17+	Employment Agreement by and between Registrant and Aaron Foster, Ph.D., effective June 1, 2016.
10.18	Notice of Expansion of Licensed Field to Obtain Additional Exclusive Rights (incorporated by reference to Exhibit 10.14 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.19*	Amended and Restated License Agreement by and between the Registrant and ARIAD Pharmaceuticals, Inc., dated March 7, 2011 (incorporated by reference to Exhibit 10.15 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.20*	Omnibus Amendment Agreement by and between Registrant and ARIAD Pharmaceuticals, Inc., dated October 3, 2014 (incorporated by reference to Exhibit 10.16 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).

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Exhibit Number	Description
10.21*	Exclusive License Agreement by and between the Registrant and Baylor College of Medicine, dated March 20, 2008 (incorporated by reference to Exhibit 10.17 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.22*	Exclusive License Agreement by and between the Registrant and Baylor College of Medicine, dated June 27, 2010 (incorporated by reference to Exhibit 10.18 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.23*	Cancer Research Grant Contract by and between the Registrant and the Cancer Prevention and Research Institute of Texas, dated July 27, 2011 (incorporated by reference to Exhibit 10.19 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.24*	Exclusive License Agreement by and between the Registrant and Baylor College of Medicine, effective November 1, 2014 (incorporated by reference to Exhibit 10.20 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.25*	License Agreement by and between the Registrant and Academish Ziekenhuis Leiden, also acting under the name Leiden University Medical Centre, effective as of April 20, 2015 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on August 13, 2015).
10.26*	License Agreement by and between the Registrant and BioVec Pharma, Inc., dated as of June 4, 2015 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on August 13, 2015).
10.27*	Exclusive License Agreement by and between the Registrant and Agensys, Inc., effective as of December 10, 2015 (incorporated by reference to Exhibit 10.33 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 14, 2016).
10.28*	Sponsored Research Agreement No. 2 by and between the Registrant and Academish Ziekenhuis Leiden, also acting under the name Leiden University Medical Centre, effective as of May 20, 2016 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on August 8, 2016).
10.29*	Research Collaboration Agreement by and between the Registrant and Ospedale Pediatrico Bambino Gesú, effective as of October 28, 2016 (incorporated by reference to Exhibit 10.40 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2017).
10.30*	

	Co-Development and Co-Commercialisation Agreement by and between the Registrant and Adaptimmune Limited, effective as of December 16, 2016 (incorporated by reference to Exhibit 10.41 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2017).
10.31*†	Cancer Research Grant Contract with the Cancer Prevention and Research Institute of Texas, dated August 9, 2017 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on November 7, 2017).
10.32	Lease Agreement by and between Registrant and Sheridan Hills Developments L.P., dated June 1, 2012 (incorporated by reference to Exhibit 10.21 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.33	First Amendment to Lease Agreement by and between Registrant and Sheridan Hills Developments L.P., dated September 13, 2013 (incorporated by reference to Exhibit 10.22 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.34	Second Amendment to Lease Agreement by and between Registrant and Sheridan Hills Developments L.P., dated June 20, 2014 (incorporated by reference to Exhibit 10.23 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.35	Third Amendment to Lease Agreement by and between Registrant and Sheridan Hills Developments L.P., dated July 21, 2014 (incorporated by reference to Exhibit 10.24 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).
10.36	Fourth Amendment to Lease Agreement by and between Registrant and Sheridan Hills Developments L.P., dated November 12, 2014 (incorporated by reference to Exhibit 10.25 to the Registrant's Registration Statement on Form S-1, as amended (File No. 333-200328), originally filed with the SEC on November 18, 2014).

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Exhibit Number	Description
10.37	Fifth Amendment to Lease Agreement by and between the Registrant and Sheridan Hills Developments L.P., effective as of September 24, 2015 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on November 9, 2016).
10.38	Lease Agreement by and between the Registrant and Sheridan Hills Developments L.P., dated as of May 6, 2015 (incorporated by reference to Exhibit 10.32 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 14, 2016).
10.39	First Amendment to Lease Agreement by and between the Registrant and Life Science Plaza Investment Group, LP, effective as of July 11, 2016 (incorporated by reference to Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on August 8, 2016).
10.40	Second Amendment to Lease Agreement by and between the Registrant and Life Science Plaza Investment Group, LP, effective as of September 26, 2016 (incorporated by reference to Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q filed with the SEC on November 9, 2016).
10.41	Loan and Security Agreement by and between the Registrant and Oxford Finance LLC dated as of December 21, 2017 (incorporated by reference to Exhibit 10.44 to the Registrant's Annual Report on Form 10-K filed with the SEC on March 13, 2018).
10.42	Open Market Sale AgreementSM, dated October 5, 2018, by and between the Registrant and Jefferies LLC (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed with the SEC on October 5, 2018).
21	Subsidiaries of the Registrant
23.1	Consent of Ernst & Young LLP, an Independent Registered Public Accounting Firm.
24.1	Power of Attorney. Reference is made to the signature page hereto.
31.1	Certification of the Principal Executive Officer pursuant to Rule 13a-14(a) or 15d-14(a) of the Securities Exchange Act of 1934.
31.2	Certification of the Principal Financial Officer pursuant to Rule 13a-14(a) or 15d-14(a) of the Securities Exchange Act of 1934.
32.1#	Certification of the Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2#	Certification of the Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.

+ Indicates management contract or compensatory plan.

* Confidential treatment has been granted with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.

This certification is deemed not filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or otherwise subject to the liability of that section, nor shall it be deemed incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended.

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ITEM 16. Form 10-K Summary

Not applicable.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Bellicum Pharmaceuticals, Inc.

Date: March 12, 2019 By: /s/ Richard A. Fair
Richard A. Fair
President and Chief Executive Officer

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Richard A. Fair as his true and lawful attorney-in-fact, with the power of substitution, for him in any and all capacities, to sign any amendments to this report, and to file the same, with exhibits thereto and other documents in connection therewith with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorney-in-fact, or his substitute or substitutes may do or cause to be done by virtue hereof. Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant in the capacities and on the dates indicated:

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Signature	Title	Date
/s/ Richard A. Fair Richard A. Fair	President, Chief Executive Officer and Member of the Board of Directors (Principal Executive Officer)	March 12, 2019
/s/ Atabak Mokari Atabak Mokari	Chief Financial Officer (Principal Financial Officer)	March 12, 2019
/s/ Rosemary Y. Williams Rosemary Y. Williams	Vice President of Finance and Controller (Principal Accounting Officer)	March 12, 2019
/s/ James Brown James Brown	Chairman of the Board of Directors	March 12, 2019
/s/ James M. Daly James M. Daly	Member of the Board of Directors	March 12, 2019
/s/ Stephen R. Davis Stephen R. Davis	Member of the Board of Directors	March 12, 2019
/s/ Reid M. Huber, Ph.D. Reid M. Huber, Ph.D.	Member of the Board of Directors	March 12, 2019
/s/ Judith Klimovsky Judith Klimovsky	Member of the Board of Directors	March 12, 2019
/s/ Jon P. Stonehouse Jon P. Stonehouse	Member of the Board of Directors	March 12, 2019
/s/ Edmund Harrigan Edmund Harrigan	Member of the Board of Directors	March 12, 2019