UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 20549

FORM 10-K

☒ **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: 001-36070

Five Prime Therapeutics, Inc.
(Exact name of registrant as specified in its charter)

Delaware	**26-0038620**
(State or other jurisdiction of incorporation or organization)	**(IRS Employer Identification No.)**

111 Oyster Point Boulevard
South San Francisco, California 94080
(415) 365-5600
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

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 $0.001 per share	**Nasdaq Global Select 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 ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes ☐ No ☒

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 ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files): Yes ☒ 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 the 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, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

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

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

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

As of June 29, 2018, the last business day of the registrant's most recently completed second fiscal quarter, the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was approximately $549 million, based on the closing price of the registrant's common stock on The Nasdaq Global Select Market on June 29, 2018 of $15.81 per share. Shares of the registrant's common stock held by each officer and director and stockholders that the registrant has concluded are affiliates of the registrant. This determination of affiliate status is not a determination for other purposes.

As of February 19, 2019, the registrant had 35,487,149 shares of common stock, par value $0.001 per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the definitive proxy statement, or the Proxy Statement, for the 2019 Annual Meeting of Stockholders of the registrant are incorporated by reference into Part III of this Annual Report on Form 10-K. The Proxy Statement will be filed with the Securities and Exchange Commission within 120 days of the registrant's fiscal year ended December 31, 2018.

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In this report, unless otherwise stated or the context otherwise indicates, references to "Five Prime," "the company," "we," "us," "our" and similar references refer to Five Prime Therapeutics, Inc. The Five Prime logo and RIPPS® are our registered trademarks. This report also contains registered marks, trademarks and trade names of other companies. All other trademarks, registered marks and trade names appearing in this report are the property of their respective holders.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS AND INDUSTRY DATA

This Annual Report on Form 10-K contains forward-looking statements. In some cases you can identify these statements by forward-looking words such as “believe,” “may,” “will,” “estimate,” “continue,” “anticipate,” “intend,” “could,” “would,” “project,” “plan,” “expect,” or similar expressions, or the negative or plural of these words or expressions. These forward-looking statements include statements concerning the following:

- our estimates regarding our expenses, revenues, anticipated capital requirements and our needs for additional financing;
- our receipt of future milestone payments and/or royalties, and the timing of such payments;
- our or our partners’ ability to timely advance drug candidates into and through clinical data readouts and successful completion of clinical trials;
- the timing of the initiation, progress and results of preclinical studies and research and development programs;
- our expectations regarding the potential safety, efficacy or clinical utility of our product candidates;
- the implementation, timing and likelihood of success of our plans to develop companion diagnostics for our product candidates;
- our ability to establish and maintain collaborations and necessary licenses;
- the implementation of our business model and strategic plans for our business, product candidates and technology;
- the scope of protection we establish and maintain for intellectual property rights covering our product candidates and technology;
- the size of patient populations targeted by products we or our partners develop and market adoption of such products by physicians and patients;
- the timing or likelihood of regulatory filings and approvals;
- the ability to negotiate pricing, coverage and adequate reimbursement for our drug candidates with third-parties and government authorities;
- developments relating to our competitors' and our industry; and
- our expectations regarding licensing, acquisitions and strategic operations.

These statements are only current predictions and are subject to known and unknown risks, uncertainties and other factors that may cause our or our industry’s actual results, levels of activity, performance or achievements to be materially different from those anticipated by the forward-looking statements. We discuss many of these risks in this report in greater detail under the heading “Risk Factors” and elsewhere in this report. You should not rely upon forward-looking statements as predictions of future events.

Although we believe that the expectations reflected in these forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance, or achievements. Except as required by law, we are under no duty to update or revise any of these forward-looking statements, whether as a result of new information, future events or otherwise, after the date of this report.

We obtained the industry, market and competitive position data in this annual report from our own internal estimates and research as well as from industry and general publications and research surveys and studies conducted by third-parties. While we believe that each of these studies and publications is reliable, we have not independently verified market and industry data from third-party sources. While we believe our internal company research is reliable and the market definitions we use are appropriate, neither such research nor these definitions have been verified by any independent source.

PART I.

Item 1. Business.

Our Company

We are a clinical-stage biotechnology company focused on discovering and developing innovative protein therapeutics to improve the lives of patients with serious diseases. Each of our product candidates has an innovative mechanism of action and addresses patient populations for which better therapies are needed. Our primary focus is on researching and developing immuno-oncology and targeted cancer therapies. In addition, we use companion diagnostics where appropriate to allow us to select patients most likely to benefit from treatment with our product candidates. The most advanced product candidates that we or our partners are developing are identified below.

- **Bemarituzumab (FPA144)** is an antibody that inhibits fibroblast growth factor receptor 2b, or FGFR2b, that we are studying in a clinical trial in combination with 5-fluorouracil (5-FU), leucovorin and oxaliplatin, a standard-of-care chemotherapy regimen known as mFOLFOX6, as front-line treatment of patients with gastric (stomach) or gastroesophageal junction, or GEJ, cancer that overexpresses FGFR2b. In December 2017, we granted Zai Lab (Shanghai) Co., Ltd., or Zai Lab, an exclusive license to develop and commercialize bemarituzumab in China, Hong Kong, Macau and Taiwan.
- **FPA150** is a CD8 T cell checkpoint inhibitor antibody that targets B7-H4 that we are studying in a clinical trial in multiple cancers.
- **FPT155** is a soluble CD80 fusion protein that enhances co-stimulation of T cells through CD28 that we are studying in a clinical trial in multiple cancers.
- **Cabiralizumab (FPA008)** is an antibody that inhibits colony stimulating factor-1, or CSF1, receptor, or CSF1R, that we and our partner Bristol-Myers Squibb Company, or BMS, are studying in clinical trials in multiple cancers in combination with BMS's PD-1 immune checkpoint inhibitor, *Opdivo*® (nivolumab). In October 2015, we granted BMS an exclusive worldwide license for the development and commercialization of cabiralizumab.
- **BMS-986258** is an anti-T cell immunoglobulin and mucin domain-3, or TIM-3, antibody that our partner, BMS, is studying in a clinical trial as a single agent and in combination with *Opdivo* in patients with advanced malignant tumors.

We are focusing our activities on immuno-oncology and targeted cancer therapies, which we believe to have significant therapeutic potential. We leverage our differentiated discovery capabilities and protein therapeutic generation and engineering capabilities to identify and validate targets that we believe could be useful in oncology and generate and preclinically test therapeutic proteins, including antibodies and fusion proteins, directed to or containing the targets we identify and validate. We plan to continue to advance selected therapeutic candidates into clinical development. Our product candidates are typically only-in-class, first-in-class or meaningfully differentiated from other in-class therapeutics. We generally look for single-agent activity or clear activity in, for example, tumor types that are rarely sensitive to checkpoint inhibitors.

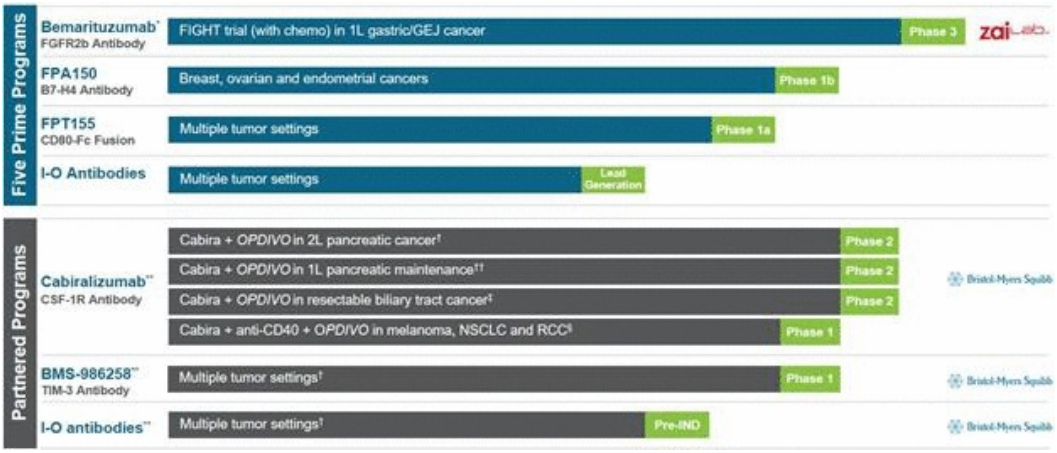
Clinical Strategy

Our goal is to use our differentiated target discovery platform and protein therapeutic generation and engineering capabilities to maintain our leadership position in the discovery of innovative protein therapeutic targets and to build a leadership position in the development and commercialization of oncology therapeutics. The key elements of our strategy to achieve this goal are:

- ***Focus on immuno-oncology and targeted protein therapeutics.*** Cancer therapeutics accounted for $133 billion in global sales in 2017. However, there continues to be significant medical need for innovative and effective cancer therapies. With the productivity of our drug discovery capabilities and the significant experience and expertise of our research, preclinical and clinical scientists in the field of oncology, we believe we are well positioned to discover new targets and develop effective, innovative protein therapeutics.
- ***Continue to advance and expand our pipeline.*** We have a robust pipeline that addresses multiple cell types in the tumor microenvironment. We and our partners are currently advancing five of our product candidates, bemarituzumab, FPA150, FPT155, cabiralizumab and BMS-986258, through clinical development, and we have other products in preclinical or earlier development. We plan to focus our resources on the further development of these product candidates, discovering and developing new therapeutic candidates with our platform, and potentially in-licensing additional product rights from third parties to expand our development pipeline.
- ***Establish additional product and clinical collaborations to supplement our development capabilities and generate funding.*** From time to time, we expect to establish additional product and clinical collaborations. These collaborations will supplement our research, development, manufacturing, regulatory and commercialization capabilities, provide us with significant funding to advance our pipeline and validate our technology.
- ***Build a U.S.-focused commercial enterprise by retaining rights for products in targeted specialty markets.*** We plan to build sales and marketing capabilities in selected specialty markets in the United States that we can adequately serve as we work toward becoming a focused commercial organization. We currently have global rights to all our product candidates, except that we granted Zai Lab an exclusive license to develop and commercialize bemarituzumab in China, Hong Kong, Macau and Taiwan, and granted BMS exclusive global rights to develop and commercialize cabiralizumab. Our cabiralizumab collaboration agreement with BMS provides us with an option to co-promote cabiralizumab in the United States.

Our Pipeline

The following table shows the stage of development of the most advanced product candidates that we are developing or that have come from our pipeline and are being developed or supported by our collaborators:



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* Partnered with Zai Lab – see "Part I—Item 1. Collaborations" for a description of our China collaboration agreement with Zai Lab.
** Partnered with BMS – see "Part I—Item 1. Collaborations" for a description of our collaboration agreements with BMS.
† Clinical development is being conducted exclusively by BMS.
†† Clinical development is being conducted by the University of California, San Diego, the sponsor of the trial, in collaboration with Stand Up To Cancer and BMS.
‡ Clinical development is being conducted by the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins, the sponsor of the trial, in collaboration with BMS.
§ Clinical development is being conducted by the Yale Cancer Center, the sponsor of the trial, in collaboration with Apexigen, Inc. and BMS.

Clinical Programs

Bemarituzumab (FPA144)

Bemarituzumab is an antibody that inhibits FGFR2b that we are developing to treat a subset of gastric (stomach) and GEJ cancer patients whose tumors overexpress FGFR2b. This subset of patients is associated with lower overall survival. We are working with third parties specializing in companion diagnostic development to develop immunohistochemistry, or IHC, and blood-based companion diagnostics to identify gastric and GEJ cancer patients who have FGFR2b overexpressing tumors or *FGFR2* gene amplification and who would be most likely to benefit from treatment with bemarituzumab.

We believe that bemarituzumab acts on tumor cells in two ways:

- bemarituzumab binds to FGFR2b and blocks certain FGFs from binding to FGFR2b, preventing these FGFs from promoting the growth of the tumor cells; and
- once bemarituzumab binds to FGFR2b on the surface of the tumor cell, bemarituzumab recruits natural killer immune cells into the tumor microenvironment to kill the tumor cell in a process called antibody-dependent cell-mediated cytotoxicity, or ADCC.

Clinical Development of Bemarituzumab

We are conducting a Phase 3 registrational trial of bemarituzumab in combination with mFOLFOX6 as front-line treatment of patients with gastric or GEJ cancer that overexpresses FGFR2b, which we refer to as our FIGHT trial. In the FIGHT trial, we are evaluating bemarituzumab in combination with mFOLFOX6 against placebo in combination with mFOLFOX6 in approximately 550 patients with advanced gastric or GEJ cancer. We will conduct the FIGHT trial at over 200 clinical trial sites in North America, Europe and Asia. We are conducting the trial in China in collaboration with Zai Lab. We continue to engage with regulatory authorities in several countries to obtain approval to initiate the FIGHT trial in those countries.

We are identifying patients for inclusion in the FIGHT trial using both an IHC test and a circulating tumor DNA, or ctDNA, blood-based test, which allows us to detect *FGFR2* gene amplification from DNA shed from tumors that circulates in blood plasma outside of cells. *FGFR2* gene amplification causes FGFR2b overexpression, and measuring *FGFR2* gene amplification in the blood is an indirect way of identifying tumors with FGFR2b overexpression that we may otherwise not identify using an IHC test. We are developing both companion diagnostics in parallel with our clinical development of bemarituzumab and are using them concurrently to more effectively identify the estimated 10% of gastric and GEJ cancer patients whose tumors overexpress FGFR2b or amplify the *FGFR2* gene who would be eligible to participate in this trial. We plan to pursue regulatory approval of each companion diagnostic contemporaneously with regulatory approval of bemarituzumab.

Because the observed incidence of gastric and GEJ cancer is higher in Asian populations than in other populations, in December 2017, we entered into a license and collaboration agreement, or the China collaboration agreement, with Zai Lab, pursuant to which we granted Zai Lab an exclusive license to develop and commercialize bemarituzumab in China, Hong Kong, Macau and Taiwan, and pursuant to which Zai Lab is conducting the Phase 3 FIGHT trial in China. We believe that our collaboration with Zai Lab will enhance our ability to enroll patients at clinical sites in China.

In June 2017, we presented in a clinical poster at the 2017 American Society of Clinical Oncology, or ASCO, Annual Meeting, or the 2017 ASCO presentation, safety and efficacy monotherapy data from 64 patients from a Phase 1 clinical trial evaluating bemarituzumab as a potential therapy in patients with gastric or GEJ cancer whose tumors overexpress FGFR2b. As of the March 20, 2017 data cut-off date for the 2017 ASCO presentation, we had tested bemarituzumab in advanced solid tumors at doses of up to 15 mg/kg given as monotherapy every two weeks, including in patients with gastric or GEJ cancer. We did not observe any dose-limiting toxicities or a maximum-tolerated dose. In addition, unlike small molecule FGF receptor kinase inhibitors, which block signaling through a broad number of FGF receptors and can lead to hyperphosphatemia, we did not observe any treatment-related hyperphosphatemia in patients treated with bemarituzumab. All treatment-related adverse events were Grades 1, 2 or 3. All treatment-related ocular adverse events were Grades 1 or 2, and no retinal toxicity was reported.

With respect to the patients with gastric or GEJ cancer, we observed preliminary anti-tumor activity with bemarituzumab monotherapy in late-line patients who had a median of three prior therapies and whose tumors overexpress the FGFR2b protein. Based on radiographic assessments by RECIST 1.1 of anti-tumor activity in the 21 patients who had FGFR2b-overexpressing gastric or GEJ cancer, we observed, as of the March 20, 2017 data cut-off date:

- four confirmed partial responses and one unconfirmed partial response;
- an objective response rate, or ORR, of 19.0%;
- a median duration of response of 15.4 weeks; and
- a disease control rate, or DCR, at 6 weeks of 57.1%.

In January 2019, we presented data from 12 patients in two cohorts from the Phase 1 safety lead-in portion of the FIGHT trial in a clinical poster at the 2019 ASCO Gastrointestinal Cancers Symposium, or the 2019 ASCO-GI presentation. As of the September 6, 2018 data cut-off date for the 2019 ASCO-GI presentation, we had tested bemarituzumab in previously-treated patients with incurable gastrointestinal cancers, including gastric or GEJ cancer, at doses of up to 15 mg/kg given in combination with mFOLFOX6 every two weeks, with an additional dose of 7.5 mg/kg of bemarituzumab given on day 8 in one cohort of patients, with the goal of achieving the target trough concentration of bemarituzumab more rapidly. We observed that, in patients receiving a dose of 15 mg/kg of bemarituzumab every two weeks with an additional dose of 7.5 mg/kg of bemarituzumab given on day 8, target trough concentration of bemarituzumab was achieved by day 15. We observed acceptable toxicity levels and did not observe any dose-limiting toxicities with the combination of bemarituzumab and mFOLFOX6. All treatment-related adverse events were Grades 1, 2 or 3. In addition, based on radiographic assessments by RECIST 1.1, as of the September 6, 2018 data cut-off date, we observed evidence of clinical activity in both of the two known patients with gastric or GEJ cancer, with one partial response and one stable disease.

Based on the data from the Phase 1 safety lead-in, we selected a dose of 15mg/kg of bemarituzumab given in combination with mFOLFOX6 every two weeks, with an additional dose of 7.5mg/kg of bemarituzumab given on day 8, for our Phase 3 FIGHT trial.

Market Opportunity

Globally, gastric cancer is the fifth most common malignancy with the third highest mortality. In the United States, Europe, Japan, South Korea and China, approximately 789,800 patients are diagnosed with gastric or GEJ cancer each year. We believe approximately 78,980 of these patients have tumors that overexpress FGFR2b or are *FGFR2* gene-amplified and are therefore more likely to respond to bemarituzumab. In addition, we believe approximately 56,870 of these patients currently receive chemotherapy-based treatment and therefore represent the target population for bemarituzumab of patients with advanced, drug-treatable tumors that overexpress FGFR2b.

In June 2016, the U.S. Food and Drug Administration, or the FDA, granted Orphan Drug Designation to bemarituzumab for the treatment of gastric cancer, including GEJ cancer, in patients whose tumors overexpress FGFR2b. We believe that our clinical development organization is well-suited to conduct a focused clinical development plan for FGFR2b-overexpressing or *FGFR2* gene-amplified gastric and GEJ cancer.

Under our China collaboration agreement, we granted Zai Lab an exclusive license to develop bemarituzumab in China, Hong Kong, Macau and Taiwan. We plan to continue to seek strategic collaborators to develop and commercialize bemarituzumab in other territories. We plan to retain the right to commercialize or co-commercialize bemarituzumab in the United States.

FPA150

FPA150 is a CD8 T cell checkpoint inhibitor antibody that targets B7-H4. B7-H4 is a member of the B7 family of checkpoint inhibitors and shares significant homology with other B7 family members, including PD-L1 and PD-L2. B7-H4 is expressed in several human tumors, including breast, ovarian, endometrial, lung and pancreatic cancers, and its expression correlates with poor prognosis. We designed FPA150 to target tumor cells through two distinct mechanisms of action: (i) by blocking B7-H4 from sending an inhibitory signal to CD8 T cells, and (ii) by enhancing ADCC against B7-H4-expressing tumor cells.

Clinical Development of FPA150

We are conducting a Phase 1a/1b clinical trial to evaluate the safety, tolerability and preliminary efficacy of FPA150 monotherapy as a potential therapy in patients with a variety of cancers. We completed the Phase 1a monotherapy dose escalation in January 2019 and have begun dosing patients in the Phase 1b expansion portion of the trial. In the Phase 1b expansion portion of the trial, we are evaluating FPA150 monotherapy in patients with HR+/HER2- and triple negative breast cancers, ovarian cancer and endometrial cancer whose tumors overexpress B7-H4.

In October 2018, we completed a Phase 1a dose escalation cohort testing a dose that has shown efficacy in preclinical models. After completing this Phase 1a dose cohort, we initiated patient dosing at this dose in an exploratory cohort to investigate FPA150 monotherapy in patients with tumors that overexpress B7-H4, with the objective of gaining additional data on safety, pharmacokinetics and potential preliminary clinical activity of FPA150 at multiple dose levels while we continued to advance in the monotherapy dose escalation portion of the trial. We expect to enroll 10 patients whose tumors overexpress B7-H4 in this exploratory cohort. All patients in the exploratory cohort will undergo pre- and on-treatment biopsies to assess the pharmacodynamic effects of FPA150 on the tumor and the tumor microenvironment.

We also plan to evaluate FPA150 in combination with Keytruda® (pembrolizumab) in this trial. We expect to begin enrollment in a Phase 1a safety lead-in of the combination in patients with advanced ovarian cancer that overexpresses B7-H4 in mid-2019, which we plan to follow with a Phase 1b expansion cohort.

We have developed a lab-developed IHC-based assay to identify patients whose tumors overexpress B7-H4 and would be eligible for inclusion in the exploratory cohort and the Phase 1b portion of the trial.

FPT155

FPT155 is a soluble CD80-Fc fusion protein. CD80 is a member of the B7 family of checkpoint inhibitors that is involved in modulating T cell priming and activation. This program came from our *in vivo* screens, which demonstrated that a soluble form of CD80 had potent *in vivo* anti-tumor activity when compared with 500 other immune-related proteins. FPT155 uses the binding interactions of soluble CD80 to (i) block CTLA-4 from competing for endogenous CD80, allowing CD28 signaling to prevail in T cell activation in the tumor microenvironment and (ii) directly engage CD28 to enhance its co-stimulatory T cell activation activity without inducing super agonism.

Clinical Development of FPT155

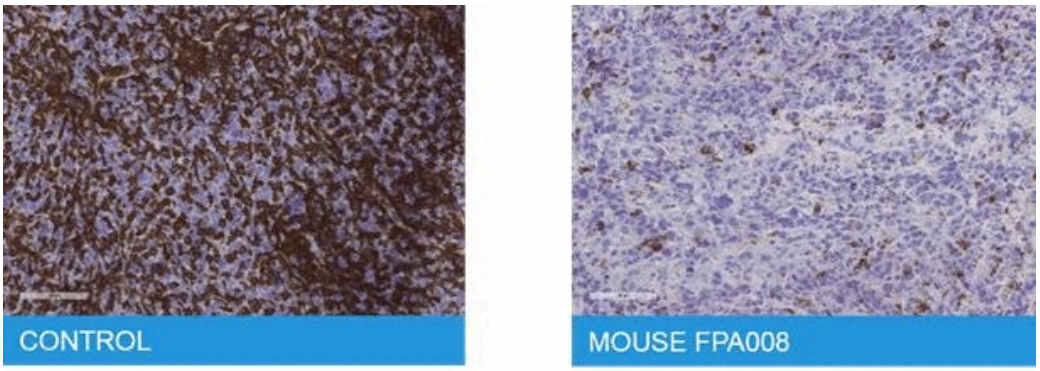
We are conducting a Phase 1a/1b clinical trial of FPT155 in patients with solid tumors. Because we expect FPT155 to have an immunomodulatory effect and our Phase 1a/1b trial is the first-in-human evaluation of FPT155, the starting dose of the dose escalation portion of the trial was lower than what we would have selected for a development candidate that does not have an immunomodulatory effect. We plan to also open an exploratory cohort during the Phase 1a dose escalation portion of the trial after we complete a cohort testing a dose that has shown efficacy in preclinical models. In the exploratory cohort, we will investigate FPT155 monotherapy in patients with solid tumors, with the objective of gaining data on safety, pharmacokinetics and potential preliminary single-agent clinical activity of FPT155. In the Phase 1b expansion portion of the trial, we plan to evaluate FPT155 in various disease-specific cohorts of patients.

Cabiralizumab (FPA008)

Cabiralizumab is an antibody that inhibits CSF1R. CSF1R is a cell surface protein that controls the survival and function of certain immune response cells called monocytes and macrophages. Monocytes and macrophages are elevated or activated in multiple disease settings. In cancer, macrophages suppress the immune system's ability to kill cancer cells. Cabiralizumab blocks the activation and survival of these cell types. In many cancers, inhibition of CSF1R reduces the number of immunosuppressive tumor-associated macrophages, or TAMs, thereby facilitating an immune response against tumors. The staining images in Figure 1 below show the inhibitory effect cabiralizumab has on TAMs in a tumor model. We believe the combination of cabiralizumab with T cell checkpoint inhibitors, such as PD-1 inhibitors, or immune agonists may have synergistic therapeutic effects in treating cancer.

Figure 1: Inhibition of Tumor-Associated Macrophages by Cabiralizumab

F4/80 Staining for Macrophages in the MC38 Tumor Model



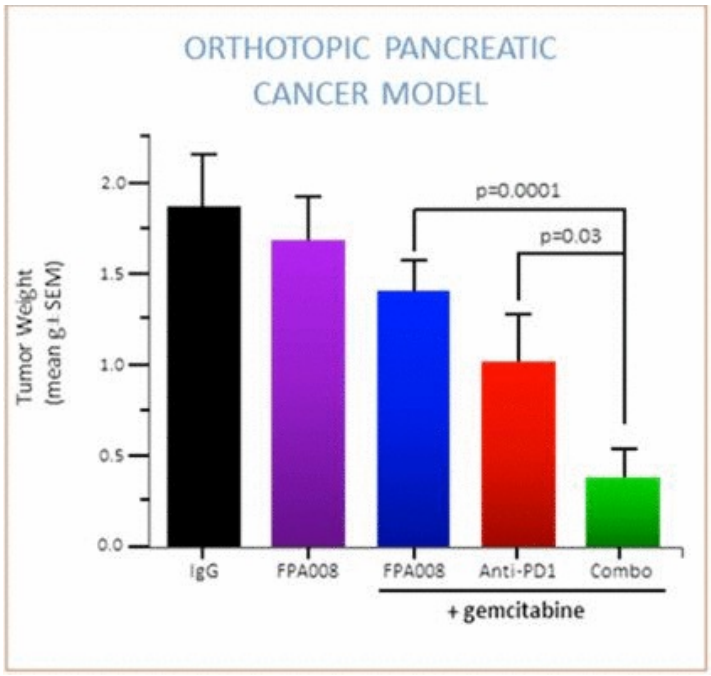
Using our differentiated target discovery platform and libraries, we discovered a protein called interleukin-34, or IL-34, that is a key regulator of monocyte and macrophage numbers and activity. Once we discovered IL-34, we were able to use our protein libraries and ligand-receptor matching technology to identify its receptor, CSF1R. This receptor is known to be expressed on the surface of monocytes and macrophages. Before our discovery of IL-34, CSF1R was thought to have only one ligand called CSF1. Both CSF1 and IL-34 bind to and activate CSF1R and therefore promote the survival and activity of monocytes and macrophages. Cabiralizumab blocks the binding of both CSF1 and IL-34 to CSF1R and thereby inhibits the activity and survival of these cells.

We believe that there is a strong rationale for combining cabiralizumab with checkpoint inhibitors to treat cancer, including that:

- TAMs are immunosuppressive and act by inhibiting CD8 T cell responses while enhancing recruitment and differentiation of regulatory T cells, or Tregs;
- TAMs often correlate with poor prognosis in cancer patients;
- TAMs appear to be sensitive to CSF1R inhibition; and
- we believe that CSF1R inhibition in combination with checkpoint inhibitors (e.g., anti-PD1 or anti-CTLA-4 antibodies) or immune agonists (e.g., anti-CD40 antibodies) may synergistically induce tumor regressions.

These points suggest that combining an anti-CSF1R antibody, such as cabiralizumab, with an anti-PD1 antibody, such as *Opdivo*, may benefit cancer patients. In preclinical studies, we observed cabiralizumab to be highly effective in blocking the growth of pancreatic tumors when combined with an anti-PD1 antibody and gemcitabine, as shown in Figure 2 below.

Figure 2: Tumor Weight Reduction of Cabiralizumab in Combination with Anti-PD1 Antibody and Gemcitabine



Clinical Development of Cabiralizumab

We are completing a Phase 1a/1b clinical trial to evaluate the safety, tolerability and preliminary efficacy of combining cabiralizumab with *Opdivo* as a potential treatment for a variety of cancers. We have completed enrollment in this trial and continue to treat patients still on study.

In November 2017, we presented preliminary safety, tolerability and efficacy data from patients from the Phase 1a/1b clinical trial at the Society for Immunotherapy of Cancer 32nd Annual Meeting, or the SITC presentation. As of the August 1, 2017 data cutoff for the SITC presentation, we had tested cabiralizumab as monotherapy in advanced solid tumors at escalating doses in 24 patients, in combination with *Opdivo* in advanced solid tumors at escalating doses of cabiralizumab in 10 patients, and in combination with *Opdivo* in advanced solid tumors in disease-specific cohorts at a dose of 4 mg/kg of cabiralizumab every two weeks in 195 patients. We observed a tolerable safety profile of cabiralizumab monotherapy and of cabiralizumab in combination with *Opdivo*. The most common treatment-related laboratory abnormalities were elevations in creatine kinase and serum liver enzymes without an associated elevation in bilirubin levels or other clinical sequelae. These treatment-related adverse abnormalities are believed to be secondary to cabiralizumab's depletion of Kupffer cells and have been observed with other CSF1R-targeting agents. The most common treatment-related adverse events were: periorbital edema (20.8%), fatigue (29.2%), nausea (12.5%) and pruritus (8.3%). Grade 5 treatment-related adverse events in the trial occurred in three (1.3%) patients treated with a combination of cabiralizumab and *Opdivo*. The Grade 5 events were pneumonitis in a patient with thyroid cancer and respiratory distress and acute respiratory distress in two patients with lung cancer.

Among the other data, we observed preliminary evidence of a durable clinical benefit of the combination therapy in the cohort of patients with advanced pancreatic cancer. Based on radiographic assessments of anti-tumor activity in the 31 second- or later-line patients who had advanced pancreatic cancer, we observed, as of the August 1, 2017 data cutoff date:

- five patients with durable clinical benefit (16%);
- four confirmed objective responses (13%); and
- disease control for at least five to over nine months.

All four confirmed objective responses were in patients with microsatellite stable tumors who had received an average of three prior therapies. In addition, the responses were accompanied by steep declines in levels of the pancreatic tumor marker CA19-9 over the baseline.

The data suggest that a combination therapy of cabiralizumab with *Opdivo* may benefit patients with pancreatic cancer, including those with microsatellite stable tumors, and support further study of cabiralizumab in combination with *Opdivo* in pancreatic cancer.

BMS is currently enrolling patients in a randomized, controlled multi-arm Phase 2 clinical trial to determine the efficacy of cabiralizumab in combination with *Opdivo*, with and without chemotherapy, as a treatment for patients with second-line pancreatic cancer (NCT03336216). BMS plans to enroll in the study approximately 160 patients with pancreatic cancer from the United States, Canada, Europe, Japan, Korea and Taiwan, each of whom will be randomized to one of four study arms based on the patient's prior therapy.

In June 2018, a poster titled "Pharmacodynamics and Genomic Profiling of Patients Treated with Cabiralizumab + Nivolumab Provide Evidence of On-Target Tumor Immune Modulations and Support Future Clinical Applications" was presented and chosen for oral discussion at the 2018 ASCO Annual Meeting. The data presented suggest that cabiralizumab in combination with nivolumab decreases immunosuppressive macrophages and increases CD8+ effector T cells in the tumor microenvironment. These data, together with preliminary clinical response data observed in patients with low tumor mutational burden, support further clinical development of cabiralizumab in combination with nivolumab in multiple indications, including pancreatic cancer. Accordingly, BMS has expanded its development of cabiralizumab within pancreatic cancer and in other tumor settings.

BMS-986258

BMS-986258 is a fully human monoclonal antibody against TIM-3, an immune checkpoint receptor that is known to limit the duration and magnitude of T cell responses. BMS-986258 binds to TIM-3 that is expressed on certain T cells, including tumor infiltrating lymphocytes. This abrogates T cell inhibition, activates antigen-specific T lymphocytes and enhances cytotoxic T cell-mediated tumor cell lysis, which together result in decreased tumor growth. BMS-986258 is BMS's first clinical candidate arising from our March 2014 immuno-oncology research collaboration.

Clinical Development of BMS-986258

BMS is conducting a Phase 1/2 clinical trial of BMS-986258 as a single agent, in combination with *Opdivo*, and in combination with Halozyme Therapeutics, Inc.'s rHuPH20 in patients with advanced malignant tumors (NCT03446040).

Target Discovery and Research Programs

When proteins in the body are inappropriately produced or altered, it can result in human diseases. These proteins can serve as targets for protein therapeutics, which can be designed to reverse these disease-causing mechanisms. There are thousands of proteins in the body that represent potential protein therapeutic targets or therapeutics themselves, but only a few are targeted by currently marketed protein drugs in oncology, such as PD-1, PD-L1, CTLA-4, IL-2, interferon alpha and CD3. While checkpoint inhibitor therapies have been validated in the clinic with agents targeting the PD-1/PD-L1 and CTLA-4 pathways, a significant proportion of patients do not respond to these treatments. New therapies are needed to address those patients who do not respond to or cannot tolerate traditional therapies or agents currently in development.

To meet this need, we are focusing our internal discovery and research efforts on targeted cancer therapies, including in immuno-oncology. One of our key priorities is building a comprehensive portfolio of therapeutic candidates that will impact the tumor microenvironment by directly killing cancer cells, by inhibiting immune checkpoints, macrophages, and regulatory T cells and by activating T cells.

We have built what we call our IND engine, consisting of our proprietary libraries of thousands of fully functional human extracellular proteins, differentiated screening capabilities, and protein therapeutic generation and engineering capabilities, which we believe provides us a competitive advantage for discovering first-in-class oncology biologics.

We have tested each of the proteins in our libraries in numerous screens on different cell types, providing us with an extensive database of information regarding how each protein performs in different screens and whether it is specific to a given disease process or has a broader range of activities. The cumulative data from all our screens allows us to identify the most appropriate target for our product candidates.

In addition, we have used our IND engine to identify dozens of targets validated in rodent models in several different disease areas, including in collaboration with our partners, and to build a growing pipeline of product candidates. We believe we have identified promising new antibody targets and ligand traps and are actively researching and validating additional oncology and immuno-regulatory targets.

Collaborations

A part of our strategy is to establish collaborations with strategic partners. These collaborations supplement our development, manufacturing, regulatory and commercialization capabilities, provide us with significant funding to advance our pipeline and validate our technology. A summary of our key product, clinical and discovery collaborations is set forth below. For information regarding the financial terms of the following agreements, including amounts we have received through December 31, 2018, see "Management's Discussion and Analysis of Financial Condition and Results of Operations – Financial Overview – Collaboration and License Revenue."

Zai Lab China License and Collaboration Agreement

In December 2017, we entered into the China collaboration agreement with Zai Lab, pursuant to which we granted Zai Lab an exclusive license to develop and commercialize bemarituzumab, and all fragments, conjugates, derivatives and modifications thereof, or the licensed antibody, in China, Hong Kong, Macau, and Taiwan, each a region, and collectively, the territory.

Under the terms of the China collaboration agreement, Zai Lab will be responsible, at its expense, for (i) developing and commercializing products containing the licensed antibody, each, a licensed product, under a territory development plan, and (ii) performing certain development activities to support our global development and registration of licensed products, including the Phase 3 FIGHT trial, in the territory, under a global development plan. In addition, Zai Lab agreed to reimburse us for certain global development activities, which is limited to a maximum of $10.0 million, and certain costs for the development of companion diagnostics.

In January 2018, pursuant to the terms of the China collaboration agreement, Zai Lab paid us a $5 million non-refundable and non-creditable upfront fee ($4.2 million after netting value-added tax withholdings of $0.8 million).

Additionally, pursuant to the China collaboration agreement, with respect to each licensed product, we will be eligible to receive up to $39.0 million in specified developmental and regulatory milestone payments.

Zai Lab will also be obligated to pay us a royalty, on a licensed product-by-licensed product and region-by-region basis, in the high teens or low twenties, depending on the number of patients Zai Lab enrolls in the FIGHT trial, subject to reduction in certain circumstances, on net sales of each licensed product in the territory until the latest of (i) 11 years after the first commercial sale of such licensed product in such region, (ii) the expiration of certain patents covering such licensed product in such region, and (iii) the date on which any applicable regulatory, pediatric, orphan drug or data exclusivity with respect to such licensed product expires in such region. We cannot determine the date on which Zai Lab's potential royalty payment obligations to us would expire because Zai Lab has not yet developed any licensed products under the agreement, and we therefore cannot at this time identify the date of the first commercial sale or any related patents covering or regulatory exclusivity periods with respect to any licensed products.

Under the China collaboration agreement, provided that Zai Lab enrolls and treats a specified number of patients in the FIGHT trial in China, Zai Lab is eligible to receive a low single-digit percentage royalty, on a licensed product-by-licensed product basis, on net sales of a licensed product outside the territory until 10 years after the first commercial sale of each such licensed product outside the territory.

Unless earlier terminated by either party, the China collaboration agreement will expire on a licensed product-by-licensed product and region-by-region basis upon the expiration of Zai Lab's payment obligations with respect to each licensed product under the agreement. Zai Lab may terminate the agreement in its entirety at any time with advance written notice. Either party may terminate the agreement in its entirety with written notice for the other party's material breach if such party fails to cure the breach. We may terminate the agreement in its entirety with written notice for Zai Lab's material breach of its diligence obligations with respect to development and obtaining marketing approval, and may terminate the agreement on a region-by-region basis for Zai Lab's breach of its diligence obligations with respect to timely commercialization of a licensed product in a region following marketing approval. We may terminate the agreement in its entirety if Zai Lab or its affiliates or sublicensees commences a legal action challenging the validity, enforceability or scope of any of our patents in the territory. Either party also may terminate the agreement in its entirety upon certain insolvency events involving the other party.

Cabiralizumab Collaboration Agreement with BMS

In October 2015, we entered into the cabiralizumab collaboration agreement with BMS, pursuant to which we granted to BMS an exclusive, worldwide license to develop and commercialize certain CSF1R antibodies, including cabiralizumab, and all modifications, derivatives, fragments or variants of such antibodies, each of which we refer to as a licensed antibody. The cabiralizumab collaboration agreement superseded the clinical trial collaboration agreement that we entered into with BMS in November 2014.

Under the terms of the cabiralizumab collaboration agreement, BMS is responsible, at its expense, for developing cabiralizumab under a development plan, subject to our option, at our own expense, to conduct certain future studies, including registration-enabling studies to support approval of cabiralizumab.

We are completing our Phase 1a/1b clinical trial to evaluate the safety, tolerability and preliminary efficacy of combining *Opdivo* with cabiralizumab in multiple tumor types. Under the agreement, BMS bears all costs and expenses relating to this trial, including manufacturing costs for the supply of cabiralizumab, except that we are responsible for our own internal costs, including internal personnel costs.

BMS is responsible for manufacturing and commercialization of cabiralizumab, and we retain rights to a minority co-promotion option in the United States.

Pursuant to the cabiralizumab collaboration agreement, BMS paid us an upfront fee of $350 million. In January 2018, the dosing of the first patient in BMS's Phase 2 clinical trial of cabiralizumab in combination with *Opdivo*, with and without chemotherapy, as a treatment for patients with second-line pancreatic cancer (NCT03336216) triggered a $25 million milestone payment to us. Additionally, we are eligible to receive up to (i) $480.0 million in specified developmental and regulatory milestone payments for all combination therapies of cabiralizumab with *Opdivo*; (ii) $542.5 million in specified developmental and regulatory milestone payments for combination therapies of cabiralizumab with one or more of BMS's or our proprietary products, at least one of which is not *Opdivo*, in the field of oncology; and (iii) $340.0 million in specified developmental and regulatory milestone payments for therapeutic uses of cabiralizumab in non-oncology indications.

BMS will also be obligated to pay us, with respect to each licensed product in each country, tiered percentage royalties ranging from the high teens to the low twenties, subject to reduction in certain circumstances, on worldwide net sales of such licensed product until the latest of (i) the expiration of certain patents covering such licensed product in such country, (ii) the date on which any applicable regulatory, pediatric, orphan drug or data exclusivity with respect to such licensed product expires in such country, (iii) the date of the first commercial sale in such country of a biosimilar product with respect to such licensed product or (iv) 12 years after the first commercial sale of such licensed product in such country. BMS will be obligated to pay us an additional low single-digit percentage royalty on net sales in the United States in the event we exercise our co-promotion option. We cannot determine the date on which BMS's potential royalty payment obligations to us would expire because BMS has not yet developed any licensed products under the agreement and therefore we cannot identify the date of the first commercial sale or any related patents covering or regulatory exclusivity periods with respect to such licensed product.

Unless earlier terminated by either party, the cabiralizumab collaboration agreement will expire on a licensed product-by-licensed product and country-by-country basis upon the expiration of BMS's payment obligations with respect to each licensed product under the agreement. BMS may terminate the agreement in its entirety or on a region-by-region basis at any time with advance written notice. BMS may also terminate the agreement in its entirety (or on a licensed product-by-licensed product basis) upon written notice based on certain safety reasons. Either party may terminate the agreement in its entirety with written notice for the other party's material breach if such party fails to cure the breach. We may terminate the agreement in its entirety with written notice for BMS's material breach of its diligence obligations with respect to development and obtaining marketing approval, and may terminate the agreement on a region-by-region basis for BMS's breach of its diligence obligations with respect to timely commercialization of a licensed product in a region following marketing approval. Either party also may terminate the agreement in its entirety upon certain insolvency events involving the other party.

BMS Immuno-oncology Research Collaboration

In March 2014, we entered into a research collaboration and license agreement, or the immuno-oncology research collaboration, with BMS pursuant to which we and BMS are collaborating to carry out a research program to (i) discover novel interacting proteins in two undisclosed immune checkpoint pathways using our target discovery platform, (ii) further the understanding of target biology with respect to targets in these checkpoint pathways, and (iii) discover and pre-clinically develop compounds suitable for development for human therapeutic uses against targets in these checkpoint pathways. Based on data arising from our initial screens, in January 2016, we amended the immuno-oncology research collaboration to add an additional undisclosed checkpoint pathway to the research program, for a total of three immune checkpoint pathways.

In December 2017, we earned a $5 million milestone payment under the discovery collaboration agreement in connection with BMS's filing of an IND for BMS-986258, BMS's anti-TIM-3 antibody. This antibody is BMS's first clinical candidate arising from the collaboration.

The initial three-year research term of the immuno-oncology research collaboration ended in March 2017. BMS exercised its option to extend the research term to March 2018 and then again to extend the research term for an additional year to March 2019. BMS agreed to provide us with funding for our additional research during the extended term. BMS does not have the right to extend the research term beyond March 2019.

In connection with entering into the immuno-oncology research collaboration, BMS paid us an upfront payment of $20.0 million. We are eligible to receive up to $235.0 million per collaboration target in specified developmental-, regulatory- and commercialization-related contingent payments comprising aggregate developmental-related contingent payments of up to $48.0 million, aggregate regulatory-related contingent payments of up to $74.0 million and aggregate commercialization-related contingent payments of up to $113.0 million. We are also eligible to receive up to $60.0 million in sales-based contingent payments per collaboration product.

For each commercialized product under the immuno-oncology research collaboration that is directed toward a target in a checkpoint pathway, BMS is also obligated to pay us tiered mid-single digit to low double-digit percentage royalties, subject to reduction in certain circumstances, on net sales of such product for the longer of (i) 12 years after the first commercial sale of such product, (ii) the life of certain licensed patents covering such product or (iii) the date on which any applicable regulatory, pediatric, orphan drug or data exclusivity with respect to such product expires. We cannot determine the date on which BMS's potential royalty payment obligations to us would expire because BMS has not yet commercialized any products under the immuno-oncology research collaboration, and we therefore cannot identify the date of the first commercial sale or any related patents covering such product.

Unless earlier terminated by either party, the immuno-oncology research collaboration will expire on a product-by-product and country-by-country basis upon the expiration of all of BMS's payment obligations under the immuno-oncology research collaboration agreement. BMS may terminate the immuno-oncology research collaboration agreement in its entirety or on a collaboration target-by-collaboration target basis at any time with advance written notice. Either party may terminate the immuno-oncology research collaboration agreement in its entirety or on a collaboration target-by-collaboration target basis with written notice for the other party's material breach if such other party fails to timely cure the breach. Either party also may terminate the immuno-oncology research collaboration agreement in its entirety upon certain insolvency events involving the other party.

GSK Respiratory Diseases Collaboration

In April 2012, we entered into a research collaboration and license agreement, or the respiratory diseases collaboration, with GSK to identify new therapeutic approaches to treat refractory asthma and chronic obstructive pulmonary disease, or COPD, function, with a particular focus on identifying novel protein therapeutics and antibody targets. We conducted six customized cell-based screens of our protein libraries under the collaboration. The research term for this collaboration ended in July 2016.

GSK has exercised options under the respiratory diseases collaboration to obtain an exclusive, worldwide license to two undisclosed respiratory disease targets we identified using our proprietary discovery platform.

Through December 31, 2018, we have received $3.6 million in target evaluation and selection fees and contingent payments with respect to each such target. We are also eligible to receive up to $122.5 million and $109 million, respectively, in potential contingent payments with respect to each such target. With respect to the first such target, these potential payments are composed of preclinical and development-related contingent payments of up to $28.5 million, regulatory-related contingent payments of up to $40.0 million and commercial-related contingent payments of up to $54.0 million. With respect to the second such target, these potential payments are composed of preclinical and development-related contingent payments of up to $15.0 million, regulatory-related contingent payments of up to $40.0 million and commercial-related contingent payments of up to $54.0 million. For each product that incorporates or targets either such target, GSK is also obligated to pay us tiered low- to mid-single digit royalties on net sales of such product for the longer of the life of certain patents licensed to GSK covering such product or 10 years after the first commercial sale of such product. We cannot determine the date on which GSK's potential royalty payment obligations to us would expire because GSK has not yet commercialized any products under the respiratory diseases collaboration, and we therefore cannot identify the date of the first commercial sale or any related patents covering such products.

The respiratory diseases collaboration agreement will terminate upon the expiration of the royalty terms of any products that incorporate or target a protein exclusively licensed under the collaboration. In addition, GSK may terminate the agreement at any time with advance written notice, and either party may terminate the agreement with written notice for the other party's material breach if such party fails to cure the breach or immediately in the case of failure to comply with certain anti-bribery and anti-corruption policies or upon certain insolvency events.

UCB Fibrosis and CNS Collaboration

In March 2013, we entered into a research collaboration and license agreement with UCB, referred to as the fibrosis and CNS collaboration, to identify innovative biologics targets and therapeutics in the areas of fibrosis-related immunologic diseases and central nervous system, or CNS, disorders. We conducted five customized cell-based and *in vivo* screens of our protein libraries under the fibrosis and CNS collaboration. We completed our initial research activities under the fibrosis and CNS collaboration in March 2016. Following the completion of the research activities, UCB had up to a two-year evaluation period during which we may be obligated to perform additional services at UCB's request.

UCB paid us an upfront payment of $6.0 million in March 2013. In addition, UCB agreed to pay us $6.6 million for a technology fee and $2.0 million for research funding. As of December 31, 2015, we fully collected the technology access fees and research funding under the fibrosis and CNS collaboration.

UCB exercised its option under the fibrosis and CNS collaboration to obtain an exclusive, worldwide license to one undisclosed fibrosis disease target we identified using our proprietary discovery platform. Through December 31, 2018, we have also received $0.4 million in target evaluation and selection fees with respect to such licensed protein target. We are eligible to receive up to $91.9 million in additional specified developmental, regulatory and commercial milestones with respect to such licensed protein target.

For each product that incorporates or targets such licensed protein target, UCB is also obligated to pay us tiered low- to mid-single digit royalties on net sales of such product for the longer of the life of certain patents covering such product or 10 years after the first commercial sale of such product. We cannot determine the date on which UCB's potential royalty payment obligations to us would expire because UCB has not yet commercialized any products under the fibrosis and CNS collaboration, and we therefore cannot identify the date of the first commercial sale or any related patents covering such products.

The collaboration agreement will terminate upon the expiration of the royalty terms of any products that incorporate or target the protein UCB exclusively licensed under the collaboration. In addition, UCB may terminate the agreement at any time with advance written notice, and either party may terminate the agreement with written notice for the other party's material breach if such party fails to cure the breach or upon certain insolvency events.

License Agreements

License Agreement with Galaxy

In December 2011, we entered into a license agreement with Galaxy Biotech LLC, or Galaxy, pursuant to which Galaxy granted us an exclusive worldwide license to develop and commercialize FGFR2b antibodies, including bemarituzumab. Under the license agreement, we are obligated to use commercially reasonable efforts to develop and commercialize at least one licensed product in at least one tumor indication.

In May 2016, we amended the license agreement to revise certain milestone definitions, reduce certain milestone payments and add certain development-related milestone payments that were triggered by dosing of certain patients in the Phase 1 clinical trial of bemarituzumab, which milestones were deemed achieved as of December 31, 2016. In May 2017, we further amended the license agreement to align the net sales definition under the agreement to the net sales definition under any sublicense we may grant under the agreement and to amend the termination provisions to allow for a direct license between Galaxy and any sublicensee upon termination of the agreement.

Through December 31, 2018, we made milestone payments to Galaxy totaling $14.6 million. We are obligated to pay Galaxy additional milestone payments of up to $77.4 million, comprising aggregate intellectual property-related milestone payments of up to $3.0 million, development-related milestone payments of up to $17.5 million for development in two indications, aggregate regulatory-related milestone payments of up to $41.5 million for two indications and aggregate commercial-related milestone payments of up to $30.0 million. We are also obligated to pay tiered royalties on net sales of bemarituzumab from the high-single digits to the low-double digits.

Our license agreement with Galaxy will remain in effect until the expiration of our royalty obligations in all countries. For each licensed product, we are obligated to pay Galaxy royalties on net sales of such product on a country-by-country basis for the longer of the life of the licensed patents covering such licensed product in such country or 10 years after the first commercial sale of such licensed product in such country. We cannot determine the date on which our royalty payment obligations to Galaxy would expire because no commercial sales of bemarituzumab have occurred and the last-to-expire relevant patent covering bemarituzumab in a given country may change in the future. Galaxy currently has issued patents, which we have licensed, covering bemarituzumab in the United States, Europe, China, Japan and other countries that expire in 2029. Further patents may issue from pending patent applications in these and other countries, and these patents would expire in 2029. These patent expiration dates do not reflect any patent term adjustments or extensions that may be available.

We may terminate the license agreement for convenience in its entirety or on a country-by-country basis upon prior written notice to Galaxy. Either party may terminate the license agreement in its entirety or with respect to certain countries after the first commercial sale of a licensed product in certain circumstances in the event of an uncured material breach by the other party. Either party may terminate the license agreement in the event of the other party's filing or institution of bankruptcy, reorganization, liquidation or receivership proceedings or upon an assignment of a substantial portion of its assets for the benefit of creditors. Galaxy may terminate the license agreement if we or any of our affiliates challenge the validity or enforceability of any patent licensed to us by Galaxy under the license agreement or if we aid or assist any affiliate or third-party in such a challenge other than as required by law.

Non-Exclusive License with BioWa-Lonza

In February 2012, we entered into a license agreement with BioWa, Inc. and Lonza Sales AG, or BioWa-Lonza, pursuant to which BioWa-Lonza granted us a non-exclusive license to use their Potelligent® CHOK1SV technology, including the CHOK1SV cell line, and a non-exclusive license to related know-how and patents. This license is necessary to produce our bemarituzumab antibody.

Under the agreement, we made milestone payments to BioWa-Lonza totaling $1.2 million through December 31, 2018. We are obligated to pay BioWa-Lonza additional milestone payments of up to $24.5 million for regulatory and commercialization milestones achieved in our bemarituzumab antibody program. We are also obligated to pay BioWa-Lonza tiered royalties on net sales of bemarituzumab up to mid-single digit percentages of the proceeds of such sales.

Our license agreement with BioWa-Lonza will remain in effect until the expiration of our royalty obligations. For each licensed product, we are obligated to pay BioWa-Lonza royalties on net sales of such licensed product on a country-by-country basis for the longer of the life of the licensed patents covering such licensed product in such country or 10 years after the first commercial sale of such licensed product in a major market country, which includes the United States. However, because we believe the last-to-expire patents currently licensed to us under the license agreement would expire in less than 10 years, we believe the date on which our royalty payment obligations to BioWa-Lonza would expire in any country would be 10 years after the first commercial sale of such product in a major market country.

We may terminate the license agreement for convenience subject to our continuing obligation to pay royalties. BioWa-Lonza may terminate the license agreement in the event of our uncured material breach, if we oppose or dispute the validity of patents licensed to us under the license agreement or if we are declared insolvent, make an assignment for the benefit of creditors, are the subject of bankruptcy proceedings or have a receiver or trustee appointed for substantially all our property.

Intellectual Property

Our intellectual property is critical to our business and we strive to protect it, including by obtaining and maintaining patent protection in the United States and internationally for our product candidates and other biological discoveries relating to new targets, pathways and relevant inventions and technologies that are important to our business. For our product candidates, we generally initially pursue patent protection covering both compositions of matter and methods of use.

Throughout the development of our product candidates, we seek to identify additional means of obtaining patent protection that would potentially enhance commercial success, including through additional methods of use, combination therapy, biomarker and companion diagnostic related claims. We also rely on trade secrets relating to our discovery platform and product candidates and seek to protect and maintain the confidentiality of proprietary information to protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection.

Our success will also depend significantly on our ability to obtain rights to intellectual property held by third-parties that may be necessary or useful to our business, including for the discovery, development and commercialization of our product candidates. We generally obtain rights to third-party intellectual property through exclusive or non-exclusive licenses. For example, we entered into a non-exclusive license with BioWa-Lonza to use their proprietary protein expression and cell line technology, which is necessary to produce our product candidates. If we are not able to obtain rights to intellectual property held by third-parties that are necessary or useful to our business, our business could be harmed, possibly materially.

The patent positions of biotechnology companies like ours are generally uncertain and involve complex legal, scientific and factual questions. In addition, the coverage claimed in a patent application can be significantly limited before the patent is issued, and its scope can be reinterpreted after issuance. Consequently, we may not obtain or maintain adequate patent protection for any of our product candidates. We cannot predict whether the patent applications we are currently pursuing will issue as patents in any particular jurisdiction or whether the claims of any issued patents will provide sufficient proprietary protection from competitors. Any patents that we hold may be challenged, circumvented or invalidated by third-parties. For a more comprehensive discussion of the risks related to our intellectual property, please see "Risk Factors—Risks Related to Our Intellectual Property."

The patent portfolios for our most advanced programs are summarized below:

Bemarituzumab

Our bemarituzumab patent portfolio includes patents and patent applications we exclusively licensed from Galaxy, as well as U.S. and foreign patents and patent applications wholly owned by us. The patent portfolio covers compositions of matter, methods of use, companion diagnostics, and combination therapies relating to bemarituzumab. The issued U.S. patents and issued foreign patents, covering compositions of matter and methods of use, expire between 2029 and 2034. Patents that may issue from the pending U.S. and foreign applications would expire between 2029 and 2039.

FPA150

Our patent portfolio for FPA150 includes pending U.S. and foreign patent applications wholly owned by us. Those pending applications cover compositions of matter, methods of use, and combination therapies relating to FPA150. Patents that may issue from the pending U.S. and foreign applications would expire between 2038 and 2039.

FPT155

Our patent portfolio for FPT155 includes pending U.S. and foreign patent applications wholly owned by us. Those pending applications cover compositions of matter, methods of use, combination therapies and biomarkers relating to FPT155. Patents that may issue from the pending U.S. and foreign applications would expire between 2036 and 2039.

Cabiralizumab

Our cabiralizumab patent portfolio includes patents and patent applications wholly owned by us as well as patents jointly owned with BMS. Our patent portfolio includes issued U.S. and foreign patents as well as pending U.S. and foreign patent applications covering compositions of matter, methods of use, biomarkers and combination therapies relating to cabiralizumab. The issued U.S. patents and issued foreign patents covering the composition of matter and methods of use expire in 2031. Patents that may issue from the pending U.S. and foreign applications would expire between 2031 and 2038.

Manufacturing

We have process development and small-scale, non-clinical manufacturing capabilities. We generally perform cell line and process development for our product candidates and manufacture quantities of our product candidates necessary to conduct preclinical studies of our investigational product candidates. We do not have and do not currently plan to acquire or develop the facilities or capabilities to manufacture bulk drug substance or filled drug product for use in human clinical trials or commercialization. We rely on third-party manufacturers to produce bulk drug substance required for our clinical trials and expect to continue to rely on third-parties to manufacture clinical trial drug supplies for the foreseeable future. BMS has the exclusive right to manufacture cabiralizumab drug substance and filled drug product. BMS will supply us with cabiralizumab, at its cost and expense, for our use in the conduct of the current trial and will supply us with cabiralizumab for the conduct of our independent cabiralizumab development activities in exchange for a pre-negotiated service fee. We also contract with additional third-parties for the filling, labeling, packaging, storage and distribution of investigational drug products. We have personnel with significant technical, manufacturing, analytical, quality and project management experience to oversee our third-party manufacturers and to manage manufacturing and quality data and information for regulatory compliance purposes.

We must manufacture drug product for clinical trial use in compliance with current Good Manufacturing Practices, or cGMP. The cGMP regulations include requirements relating to organization of personnel, buildings and facilities, equipment, control of components and drug product containers and closures, production and process controls, packaging and labeling controls, holding and distribution, laboratory controls, records and reports, and returned or salvaged products. The manufacturing facilities for our products must meet cGMP requirements and FDA satisfaction before any product is approved. Our third-party manufacturers are also subject to periodic inspections of facilities by the FDA and other authorities, including procedures and operations used in the testing and manufacture of our products to assess our compliance with applicable regulations. Failure to comply with statutory and regulatory requirements subjects a manufacturer to possible legal or regulatory action, including warning letters, the seizure or recall of products, injunctions, consent decrees placing significant restrictions on or suspending manufacturing operations and civil and criminal penalties. These actions could have a material impact on the availability of our products. Contract manufacturers often encounter difficulties involving production yields, quality control and quality assurance, as well as shortages of qualified personnel.

Commercialization

We have not yet established sales, marketing or product distribution operations. We generally expect to retain some commercial rights in the United States for our product candidates in specialty markets. Pursuant to our cabiralizumab collaboration agreement, we have a co-promotion right in the United States which, if we exercise, will allow us to field a minority percentage of the total United States sales force promotional effort. If we exercise our option to co-promote cabiralizumab in the United States prior to submission of a biological license application, or BLA, we expect to commence commercialization activities by building a focused sales and marketing organization in the United States. We believe that such an organization will be able to address the community of oncologists who are the key specialists in treating the patient populations for which cabiralizumab is being developed.

Competition

The biotechnology and pharmaceutical industries are characterized by continuing technological advancement and significant competition. While we believe that our product candidates, technology, knowledge, experience and scientific resources provide us with competitive advantages, we face competition from major pharmaceutical and biotechnology companies, academic institutions, governmental agencies and public and private research institutions, among others. Any product candidates that we successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future. Key product features that would affect our ability to effectively compete with other therapeutics include the efficacy, safety and convenience of our products and the ease of use and effectiveness of any companion diagnostics. The level of generic competition and the availability of reimbursement from government and other third-party payors will also significantly affect the pricing and competitiveness of our products. 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.

Many of the companies against which we may compete have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining regulatory approvals and marketing approved products than we do. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

Government Regulation and Product Approval

In the United States, the FDA regulates protein therapeutics like cabiralizumab, bemarituzumab, FPA150, FPT155 and our other product candidates as biological drug products, or biologics, under the Federal Food, Drug, and Cosmetic Act, the Public Health Service Act and related regulations. Biologics are also subject to other federal, state and local statutes and regulations. Failure to comply with the applicable United States regulatory requirements at any time during the product development process, approval process or after approval may subject an applicant to administrative or judicial actions. These actions could include the suspension or termination of clinical trials by the FDA or an Institutional Review Board, or IRB, the FDA's refusal to approve pending applications or supplements, revocation of a biologics license, warning letters, product recalls, product seizures, total or partial suspension of production or distribution, import detention, injunctions, civil penalties or criminal prosecution. Any administrative or judicial action could have a material adverse effect on us.

The FDA and comparable regulatory agencies in state and local jurisdictions and in foreign countries impose substantial requirements upon the clinical development, manufacture and marketing of biologics. These agencies and other federal, state and local entities regulate research and development activities and the testing, manufacture, quality control, effectiveness, safety, purity, potency, labeling, storage, distribution, record keeping and reporting, approval, import and export, advertising and promotion and post-market surveillance of our products.

The FDA's and comparable regulatory agencies' policies may change and additional government regulations may be enacted that could prevent or delay regulatory approval of any future product candidates or approval of product or manufacturing changes, new disease indications, or label changes. We cannot predict the likelihood, nature or extent of adverse governmental regulation that might arise from future legislative or administrative action, either in the United States or abroad.

Biologics Product Development

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

- nonclinical laboratory and animal tests;
- submission of an IND application, which must become effective before clinical trials may begin;
- adequate and well-controlled human clinical trials to establish the safety, purity and potency of the proposed biologic for its intended use or uses;
- pre-approval inspection of manufacturing facilities and clinical trial sites; and
- FDA approval of a BLA, which must occur before a biologic can be marketed or sold.

The testing and approval process requires substantial time and financial resources, and we cannot be certain that any new approvals for our product candidates will be granted on a timely basis, if at all.

Before testing any compound in human subjects, a company must develop extensive preclinical data. Preclinical testing generally includes laboratory evaluation of product chemistry and formulation as well as toxicological and pharmacological studies in several animal species to assess the quality and safety of the product. Animal studies must be performed in compliance with the FDA's Good Laboratory Practice, or GLP, regulations and the United States Department of Agriculture's Animal Welfare Act and related regulations.

Prior to commencing the first clinical trial in humans, an IND application must be submitted to the FDA. A company must submit preclinical testing results to the FDA as part of the IND, and the FDA must evaluate whether there is an adequate basis for testing the drug in humans. The IND application automatically becomes effective 30 days after receipt by the FDA unless the FDA within the 30-day time period raises concerns or questions about the conduct of the clinical trial and places the trial on clinical hold. In such case, the IND application sponsor must resolve any outstanding concerns with the FDA before the clinical trial may begin. Further, an independent IRB for each site proposing to conduct the clinical trial must review and approve the plan for any clinical trial before it commences at that site. Informed consent must also be obtained from each study subject. Regulatory authorities, an IRB, a data safety monitoring board or the study sponsor may suspend or terminate a clinical trial at any time on various grounds, including a finding that the participants are being exposed to an unacceptable safety risk.

A clinical trial sponsor is required to submit to the National Institutes of Health, or NIH, for public posting on NIH's clinical trial website details about certain active clinical trials and clinical trial results. For purposes of BLA approval, human clinical trials are typically conducted in the following phases, which may overlap:

- Phase 1 — the biologic is initially given to healthy human subjects or patients and tested for safety, dosage tolerance, reactivity, absorption, metabolism, distribution and excretion. These trials may also provide early evidence of effectiveness. During Phase 1 clinical trials, sufficient information about the investigational product's effects may be obtained to permit the design of well-controlled and scientifically valid Phase 2 clinical trials.
- Phase 2 — clinical trials are conducted in a limited number of patients in the target population to identify possible adverse effects and safety risks, to determine the efficacy of the product for specific targeted diseases and to determine dosage tolerance and optimal dosage. Multiple Phase 2 clinical trials may be conducted by the sponsor to obtain information prior to beginning larger and more expensive Phase 3 clinical trials.

- Phase 3 — when Phase 2 evaluations demonstrate that a dosage range of the product appears effective and has an acceptable safety profile and provide sufficient information for the design of Phase 3 clinical trials, Phase 3 clinical trials are undertaken to provide statistically significant evidence of clinical efficacy and to further test for safety in an expanded patient population at multiple clinical trial sites. Phase 3 clinical trials are performed after preliminary evidence suggesting effectiveness of the drug has been obtained, and are intended to further evaluate dosage, effectiveness and safety, to establish the overall benefit-risk relationship of the investigational drug, and to provide an adequate basis for product approval by the FDA.

All of these trials must be conducted in accordance with Good Clinical Practice, or GCP, requirements in order for the data to be considered reliable for regulatory purposes.

The Biologic License Application Approval Process

In order to obtain approval to market a biologic in the United States, a BLA must be submitted to the FDA that provides data establishing to the FDA's satisfaction the safety and effectiveness of the investigational product for the proposed indication. Each BLA submission requires a substantial user fee payment unless a waiver or exemption applies. The application includes all relevant data available from pertinent nonclinical studies and clinical trials, including negative or ambiguous results as well as positive findings, together with detailed information relating to the product's chemistry, manufacturing, controls and proposed labeling, among other things. Data can come from company-sponsored clinical trials intended to test the safety and effectiveness of a use of a product. In addition, the application may include supplemental data from a number of alternative sources, including studies initiated by investigators.

The FDA will initially review a BLA for completeness before it accepts it for filing. Under the FDA's procedures, the agency has 60 days from its receipt of a BLA, or the filing period, to determine whether the application will be accepted for filing based on the agency's threshold determination that the application is sufficiently complete to permit substantive review. After the BLA submission is accepted for filing, the FDA reviews the BLA to determine, among other things, whether the proposed product is safe, efficacious, pure and potent, which includes determining whether it is effective for its intended use, and whether the product is being manufactured in accordance with cGMP, and to assure and preserve the product's identity, strength, quality, potency and purity. The FDA may refer applications for novel products or 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, if so, 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 approval process, the FDA also will determine whether a Risk Evaluation and Mitigation Strategy, or REMS, is necessary to assure that the benefits of the biologic outweigh its risks. A REMS may include various elements depending on what the FDA considers necessary for the safe use of the drug. These elements range from a medication guide or patient package insert to training and certification requirements for prescribers and/or pharmacies to safe use conditions that must be in place before the drug is dispensed. If the FDA concludes that a REMS is needed, the BLA sponsor must submit a proposed REMS that the FDA deems satisfactory or the FDA will not approve the BLA.

The FDA's standard review time for a BLA for a new molecular entity is 10 months from the end of the 60-day filing period. Based on pivotal clinical trial results submitted in a BLA, at the discretion of the FDA or upon the request of an applicant, the FDA may grant a priority review designation to a product, which sets the target date for FDA action on the application at six months from the end of the filing period. Priority review is given for a product that treats a serious condition and, if approved, would provide a significant improvement in safety or effectiveness compared to marketed products or offer a therapy where no satisfactory alternative therapy exists. Priority review designation does not change the scientific or medical standard for approval or the quality of evidence necessary to support approval.

After the FDA completes its review of a BLA, it will either communicate to the sponsor that it will approve the product, or issue a complete response letter to communicate that it will not approve the BLA in its current form and to inform the sponsor of changes that the sponsor must make or additional clinical, nonclinical or manufacturing data that must be received before the FDA can approve the application, with no implication regarding the ultimate approvability of the application. If a complete response letter is issued, the sponsor may either resubmit the BLA, addressing all deficiencies identified in the letter, or withdraw the application. Resubmitting a BLA in response to a complete response letter can add additional time to the approval process for a product.

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 are adequate to assure consistent production of the product within required specifications. Additionally, before approving a BLA, the FDA may inspect one or more clinical sites to assure compliance with GCP. If the FDA determines the application, manufacturing process or manufacturing facilities are not acceptable, it typically will outline the deficiencies and often will request additional testing or information. This may significantly delay further review of the application. If the FDA finds that a clinical site did not conduct the clinical trial in accordance with GCP, the FDA may determine the data generated by the clinical site should be excluded from the primary efficacy analyses provided in the BLA. Additionally, notwithstanding the submission of any requested additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval.

The testing and approval process for a biologic requires substantial time, effort and financial resources and this process may take several years to complete. Data obtained from clinical activities are not always conclusive and may be susceptible to varying interpretations, which could delay, limit or prevent regulatory approval. The FDA may not grant approval on a timely basis or at all. We may encounter difficulties or unanticipated costs in our efforts to secure necessary governmental approvals, which could delay or preclude us from marketing our products.

The FDA may require, or companies may pursue, additional clinical trials after a product is approved. These so-called Phase 4 clinical trials may be made a condition to be satisfied for continuing product approval. The results of Phase 4 clinical trials can confirm the effectiveness of a product candidate and can provide important safety information. Conversely, the results of Phase 4 clinical trials can raise new safety or effectiveness issues that were not apparent during the original review of the product, which may result in product restrictions or even withdrawal of product approval. The FDA has express statutory authority to require sponsors to conduct post marketing studies or clinical trials to specifically address safety issues identified by the agency. If any of our products are subject to post-marketing requirements and commitments, there may be resource and financial implications for our business.

Even if a product candidate receives regulatory approval, the approval will be limited to specific disease states, patient populations and/or dosages, or might contain significant limitations on use in the form of warnings, precautions or contraindications, or in the form of onerous risk management plans, restrictions on distribution, or post-marketing study or clinical trial requirements. Further, even after regulatory approval is obtained, later discovery of previously unknown problems with a product may result in restrictions on the product, requirements to conduct additional studies or trials, or even complete withdrawal of the product from the market. In addition, we cannot predict what adverse governmental regulations may arise from future United States or foreign governmental action.

FDA Post-Approval Requirements

Any products manufactured or distributed by us or on our behalf pursuant to FDA approvals are subject to continuing regulation by the FDA, including requirements for record-keeping, reporting of adverse experiences with the biologic, and submitting biological product deviation reports to notify the FDA of unanticipated changes in distributed products. Manufacturers are required to register their facilities 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 standards. This requires us and our third-party manufacturers to implement certain quality processes, manufacturing controls and documentation requirements in order to ensure that the product is safe, has the identity and strength, and meets the quality, purity and potency characteristics that it purports to have. Certain states also impose requirements on manufacturers and distributors to establish the pedigree of product in the chain of distribution, including some states that require manufacturers and others to adopt new technology capable of tracking and tracing product as it moves through the distribution chain. We cannot be certain that we or our present or future suppliers will be able to comply with the cGMP and other FDA regulatory requirements. If our present or future suppliers are not able to comply with these requirements, the FDA may halt our clinical trials, refuse to approve any BLA or other application, force us to recall a drug from distribution, shut down manufacturing operations or withdraw approval of the BLA for that biologic. Noncompliance with cGMP or other requirements can result in issuance of warning letters, civil and criminal penalties, seizures, and injunctive action.

The FDA and other federal and state agencies closely regulate the labeling, marketing and promotion of drugs. While doctors may prescribe any product approved by the FDA for any use as long as consistent with any REMS restrictions, if applicable, a company can only make claims relating to safety and efficacy of a product that are consistent with FDA approval, and the company is allowed to market a drug only for the particular use and treatment approved by the FDA. In addition, any claims we make relating to our products in advertising or promotion must be appropriately balanced with important safety information and otherwise be adequately substantiated. Failure to comply with these requirements can result in adverse publicity, warning letters, corrective advertising, injunctions, potential civil and criminal penalties, criminal prosecution, and agreements with governmental agencies that materially restrict the manner in which we may promote or distribute drug products. Government regulators, including the Department of Justice and the Office of the Inspector General of the Department of Health and Human Services, as well as state authorities, recently have increased their scrutiny of the promotion and marketing of drugs.

Orphan Drug and Orphan Medicinal Product Designation and Exclusivity

The Orphan Drug Act provides incentives for the development of products intended to treat rare diseases or conditions, which are generally diseases or conditions that affect fewer than 200,000 individuals in the United States. If a sponsor demonstrates that a biologic is intended to treat rare diseases or conditions, the FDA will grant orphan designation for that product. Orphan designation must be requested before submitting a BLA.

Under the Pediatric Research Equity Act, or the PREA, submission of a pediatric assessment is not typically required for pediatric investigation of a product that has been granted orphan drug designation. However, under the FDA Reauthorization Act of 2017, the scope of the PREA was extended to require pediatric studies for products intended for the treatment of an adult cancer that are directed at a molecular target that the Secretary of Health and Human Services determines to be substantially relevant to the growth or progression of a pediatric cancer. In addition, the FDA issued guidance in 2017 that it no longer intends to grant orphan drug designation to products for pediatric subpopulations of common diseases unless the use of the drug in the pediatric subpopulation meets the criteria for an orphan disease or unless the disease in the pediatric subpopulation is considered a different disease from the disease in the adult population.

The benefits of orphan drug designation include research and development tax credits and exemption from FDA user fees. Orphan designation, however, does not convey any advantage in, or shorten the duration of, the regulatory review and approval process. Generally, if a product that receives orphan designation is approved for the orphan indication, it receives orphan drug exclusivity, which for seven years prohibits the FDA from approving another product with the same active ingredient for the same use. Additionally, if a biologic designated as an orphan product receives marketing approval for an indication broader than what is designated, it may not be entitled to orphan drug exclusivity.

Orphan exclusivity will not bar approval of another product under certain circumstances, including if a subsequent product with the same active ingredient for the same indication is shown to be clinically superior to the approved product on the basis of greater efficacy or safety, or provides a major contribution to patient care, or if the company with orphan drug exclusivity is not able to meet market demand. Further, the FDA may approve more than one product for the same orphan indication or disease as long as the products contain different active ingredients. As a result, even if one of our product candidates receives orphan exclusivity, the FDA can still approve other drugs that have a different active ingredient for use in treating the same indication or disease, which could create a more competitive market for us.

After the FDA grants orphan designation, the identity of the applicant, as well as the name of the therapeutic agent and its designated orphan use, are disclosed publicly by the FDA.

Similarly, the European Commission grants orphan medicinal product designation to products intended for the treatment, prevention or diagnosis of a disease that is life-threatening or chronically debilitating affecting not more than five in 10,000 people. In order to receive orphan designation, there must also be no satisfactory method of diagnosis, prevention or treatment of the condition, or if such a method exists, the medicine must be of significant benefit to those affected by the condition. In addition, sponsors are required to submit to the EMA's Pediatric Committee, or the PDCO, and comply with a pediatric investigation plan, or a PIP, in order to initiate pivotal clinical investigation and seek marketing authorization in the EU.

Designated orphan medicinal products are entitled to a range of incentives during the development and regulatory review process, including scientific assistance for study protocols, a partial or total reduction in fees and eligibility for conditional marketing authorization. Once authorized, orphan medicinal products are entitled to 10 years of market exclusivity in all EU member states. However, marketing authorization may be granted to a similar medicinal product with the same orphan indication during the 10-year period with the consent of the marketing authorization holder for the original orphan medicinal product or if the manufacturer of the original orphan medicinal product is unable to supply sufficient quantities of such product. Marketing authorization may also be granted to a similar medicinal product with the same orphan indication if the similar product is established to be safer, more effective or otherwise clinically superior to the original orphan medicinal product. After five years, a member state can request that the period of market exclusivity be reduced to six years if it can be demonstrated the criteria for orphan designation no longer apply and the medicine is sufficiently profitable. The period of market exclusivity may be extended by two years for medicines that have also complied with an agreed PIP.

Biologics Price Competition and Innovation Act of 2009

The Biologics Price Competition and Innovation Act of 2009, or BPCIA, created a licensure framework for biosimilars, which could ultimately subject our biological product candidates to competition from biosimilars. Under the BPCIA, a manufacturer may submit an abbreviated application for licensure of a biologic that is "biosimilar to" a referenced branded biologic. This abbreviated approval pathway is intended to permit a biosimilar to come to market more quickly and less expensively than if a "full" BLA were submitted, by relying to some extent on the FDA's previous review and approval of the reference biologic to which the proposed product is similar.

Under the BPCIA, a biosimilar sponsor's ability to seek or obtain approval through the abbreviated pathway is limited by periods of exclusivity granted to the sponsor of the reference product. No biosimilar application may be submitted until four years after the date of approval of the reference product, and no such application, once submitted, may receive final approval until twelve years after that same date (with a potential six-month extension of exclusivity if certain pediatric studies are conducted and the results are reported to the FDA). Once approved, biosimilar products likely would compete with (and in some circumstances, may be deemed under the law to be "interchangeable with") the previously approved reference product.

FDA Regulation of Companion Diagnostics

As part of our clinical development plans, have engaged third-party collaborators to develop companion diagnostics to identify patients most likely to respond to our product candidates. Companion diagnostics are classified as medical devices under the Federal Food, Drug, and Cosmetic Act in the United States. The FDA regulates medical device design and development, preclinical and clinical testing, premarket clearance or approval, registration and listing, manufacturing, labeling, storage, reporting, recordkeeping, advertising and promotion, export and import, sales and distribution, and post-market surveillance. Unless an exemption applies, companion diagnostics require marketing clearance or approval from the FDA prior to commercial distribution. The two primary types of FDA marketing authorization applicable to a medical device are premarket notification, also called 510(k) clearance, and premarket approval, or PMA. The use of companion diagnostics with therapeutic products raises important concerns about the safety and effectiveness of both the companion diagnostic devices and the corresponding therapeutic products and, therefore, ordinarily will require a PMA before they are marketed. Because the diagnostic tests that we plan to develop are essential for the safety and effective use of our therapeutics in selected patients, these diagnostic tests would be subject to the PMA approval process.

The PMA process is costly, lengthy and uncertain. PMA applications must be supported by valid scientific evidence, which typically requires extensive data, including technical, preclinical, clinical and manufacturing data, to demonstrate to the FDA's satisfaction the safety and effectiveness of the device. For companion diagnostic tests, a PMA application typically includes data regarding analytical and clinical validation studies. As part of its review of the PMA, the FDA will conduct a pre-approval inspection of the manufacturing facility or facilities to ensure compliance with the Quality System Regulation, which requires manufacturers to follow design, testing, control, documentation and other quality assurance procedures. FDA review of an initial PMA application is required by statute to take six months. If the FDA evaluations of both the PMA application and the manufacturing facilities are favorable, the FDA will either issue an approval letter or an approvable letter, which usually contains a number of conditions that must be met in order to secure final approval of the PMA. If the FDA's evaluation of the PMA or manufacturing facilities is not favorable, the FDA will deny approval of the PMA or issue a not approvable letter. A not approvable letter will outline the deficiencies in the application, and where practical, will identify what is necessary to secure approval of the PMA. The FDA may also determine that additional clinical trials are necessary, in which case the PMA may be delayed for several months or years while such trials are conducted and the data then submitted in an amendment to the PMA. Once granted, a PMA may be withdrawn by the FDA if compliance with post-approval requirements, conditions of approval or other regulatory standards are not maintained or problems are identified following initial marketing.

We and any third party collaborator who we engage to develop companion diagnostics will work cooperatively to generate the data required for submission with the PMA application, and will remain in contact with the Center for Devices and Radiological Health, or CDRH, at the FDA to ensure that any changes in requirements are incorporated into the development plans. We anticipate that meetings with the FDA with regard to our drug product candidates, as well as companion diagnostic product candidates, will include representatives from the Center for Drug Evaluation and Research, or the CDER, and CDRH to ensure that the BLA and PMA submissions are coordinated to enable the FDA to conduct a parallel review of both submissions. FDA guidance addresses issues critical to developing companion diagnostics, such as biomarker qualification, establishing clinical validity, the use of retrospective data, the appropriate patient population and when the FDA will require that the device and the drug be approved simultaneously. According to the guidance, if safe and effective use of a therapeutic product depends on a diagnostic, then the FDA generally will require approval or clearance of the diagnostic contemporaneously with the FDA's approval of the therapeutic product. We plan to structure our programs for the development of our companion diagnostics to be consistent with this guidance.

In the European Economic Area, or the EEA, *in vitro* medical devices are required to conform with essential requirements by undergoing a conformity assessment procedure. The conformity assessment varies according to the type of medical device and its classification. For low-risk devices, the conformity assessment can be carried out internally, but for higher risk devices it requires the intervention of an accredited EEA Notified Body. If successful, the conformity assessment concludes with the drawing up by the manufacturer of an EC Declaration of Conformity entitling the manufacturer to affix the CE mark to its products and to sell them throughout the EEA. We expect our companion diagnostic will require a conformity assessment through an accredited EEA Notified Body, and that the data generated for the U.S. registration will be sufficient to satisfy the regulatory requirements for the European Union and other countries.

Coverage and Reimbursement

In both domestic and foreign markets, sales of any products for which we may receive regulatory approval will depend in part upon the availability of coverage and reimbursement from third-party payors. Such third-party payors include government health programs, such as Medicare and Medicaid, private health insurers and managed care providers, and other organizations. Coverage decisions may depend upon clinical and economic standards that disfavor new drug products when more established or lower cost therapeutic alternatives are already available or subsequently become available. Assuming coverage is granted, the reimbursement rates paid for covered products might not be adequate. Even if favorable coverage status and adequate reimbursement rates are attained, less favorable coverage policies and reimbursement rates may be implemented in the future. The marketability of any products for which we may receive regulatory approval for commercial sale may suffer if the government and other third-party payors fail to provide coverage and adequate reimbursement to allow us to sell such products on a competitive and profitable basis. For example, under these circumstances, physicians may limit how much or under what circumstances they will prescribe or administer our products and patients may decline to purchase such products. This, in turn, could affect our ability to successfully commercialize our products and impact our profitability, results of operations, financial condition, and future success.

The market for any product candidates for which we may receive regulatory approval will depend significantly on the degree to which these products are listed on third-party payors' drug formularies or lists of medications for which third-party payors provide coverage and reimbursement. The industry competition to be included on such formularies often leads to downward pricing pressures on pharmaceutical companies. Also, third-party payors may refuse to include a particular branded drug on their formularies or otherwise restrict patient access to a branded drug when a less costly generic equivalent or other alternative is available. In addition, because each third-party payor may individually establish coverage and reimbursement policies, obtaining coverage and adequate reimbursement can be a time-consuming and costly process. We may be required to provide scientific and clinical support for the use of any product to each third-party payor separately with no assurance that approval would be obtained, and we may need to conduct expensive pharmacoeconomic studies in order to demonstrate the cost-effectiveness of our products. We cannot be certain that our product candidates will be considered cost-effective. This process could delay the market acceptance of any product candidates for which we may receive approval and could have a negative effect on our future revenues and operating results.

Anti-Kickback, False Claims, Physician Payments Sunshine and Other Healthcare Laws

In addition to FDA restrictions on marketing, several other types of U.S. state and federal laws are relevant to certain marketing practices in the pharmaceutical and medical device industries and their other interactions with healthcare providers. These laws include the Federal Anti-Kickback Statute, false claims statutes, and the Federal Physician Payments Sunshine Act and other healthcare laws. We are subject to these laws and they may affect our business. The Federal Anti-Kickback Statute prohibits, among other things, any person or entity from knowingly and willfully soliciting, receiving, offering or paying remuneration, directly or indirectly, in exchange for or to induce either the referral of an individual for, or the purchase, lease, order or recommendation of, any good or service for which payment may be made under federal healthcare programs such as the Medicare and Medicaid programs. This statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, purchasers, formulary managers and other individuals and entities on the other hand. Violations of the Federal Anti-Kickback Statute are punishable by imprisonment, criminal fines, civil monetary penalties and exclusion from participation in federal healthcare programs. The Federal Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010 and subsequent legislation, or collectively, the Affordable Care Act, among other things, amended the intent requirement of the Federal Anti-Kickback Statute. A person or entity no longer needs to have actual knowledge of this statute or specific intent to violate it in order to have committed a violation. In addition, the Affordable Care Act provides that the government may assert that a claim including items or services resulting from a violation of the Federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the Federal False Claims Act. There are a number of statutory exceptions and regulatory safe harbors protecting certain common activities from prosecution or other regulatory sanctions; however, the exceptions and safe harbors are drawn narrowly, and practices that do not fit squarely within an exception or safe harbor may be subject to scrutiny.

The Federal False Claims Act prohibits, among other things, any person from knowingly presenting, or causing to be presented, a false or fraudulent claim for payment to a government program, or knowingly making, or causing to be made, a false record or statement material to a false or fraudulent claim. Many pharmaceutical and other healthcare companies have faced investigations and private lawsuits and, in many cases, have agreed to significant and burdensome settlements under these laws for a variety of allegedly improper promotional and marketing activities, including inflating drug prices they report to pricing services, which in turn were used by the government to set Medicare and Medicaid reimbursement rates; providing free product to customers with the expectation that the customers would bill federal programs for the product; providing consulting fees and other benefits to physicians to induce them to prescribe products; or engaging in promotion for "off-label" uses. Federal False Claims Act violations may result in significant civil monetary penalties, including three times the damages incurred by the government from the violation and exclusion from participation in federal healthcare programs. The majority of U.S. states also have statutes or regulations similar to the Federal Anti-Kickback Statute and Federal False Claims Act, which apply to items and services reimbursed under Medicaid and other state programs, and in some states, apply regardless of the payor.

The federal Health Insurance Portability and Accountability Act of 1996, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, and its implementing regulations, or HIPAA, imposes criminal liability for knowingly and willfully executing a scheme to defraud any healthcare benefit program, knowingly and willfully embezzling or stealing from a healthcare benefit program, willfully obstructing a criminal investigation of a healthcare offense, or knowingly and willfully making false statements relating to healthcare matters. HIPAA also imposes obligations on certain covered entity healthcare providers, health plans and healthcare clearinghouses as well as their business associates that perform certain services involving the use or disclosure of individually identifiable health information, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information.

The federal Physician Payments Sunshine Act, being implemented as the Open Payments Program, requires certain manufacturers of products for which payment is available under Medicare, Medicaid, or the Children's Health Insurance Program to track payments and other transfers of value to physicians and teaching hospitals, as well as physician ownership and investment interests, and to publicly report such data. Manufacturers subject to the Open Payments Program must submit a report on or before the 90th day of each calendar year disclosing reportable payments made in the previous calendar year. Failure to comply with the reporting obligations may result in civil monetary penalties.

Several states now require pharmaceutical companies to report expenses relating to the marketing and promotion of pharmaceutical products in those states and to report gifts and payments to individual healthcare providers in those states. Some of these states also prohibit certain marketing related activities including the provision of gifts, meals, or other items to certain healthcare providers. Some states also require pharmaceutical companies to implement compliance programs or marketing codes and report information on the pricing of certain drugs. Certain state and local laws also require the registration of pharmaceutical sales representatives.

Because of the breadth of these laws and the narrowness of available statutory exceptions and regulatory exemptions, it is possible that some of our business activities could be subject to challenge under one or more of such laws. If our operations are found to be in violation of any of the federal or state laws described above or any other governmental regulations that apply to us, we may be subject to penalties, including significant criminal, civil monetary penalties, damages, fines, imprisonment, exclusion from participation in government programs, injunctions, recall or seizure of products, total or partial suspension of production, denial or withdrawal of pre-marketing product approvals, private "qui tam" actions brought by individual whistleblowers in the name of the government, 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, 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.

To the extent that any of our products are sold in a foreign country, we may be subject to similar foreign laws and regulations, which may include, for instance, applicable post-marketing requirements, including safety surveillance, anti-fraud and abuse laws, and implementation of corporate compliance programs and reporting of payments or transfers of value to healthcare professionals.

Healthcare Reform

The United States and some foreign jurisdictions are considering or have enacted a number of legislative and regulatory proposals to change the healthcare system in ways that could affect our ability to sell our product candidates profitably, even if they are approved for sale. Among policy makers and payors in the United States and elsewhere, there is significant interest in promoting changes in healthcare systems with the stated goals of containing healthcare costs, improving quality and/or expanding access. In the United States, the pharmaceutical and medical device industries have been a particular focus of these efforts and have been significantly affected by major legislative initiatives.

In March 2010, the Affordable Care Act was enacted, which includes measures that have or will significantly change the way healthcare is financed by both governmental and private insurers.

Some of the provisions of the Affordable Care Act have yet to be implemented, and there have been judicial and Congressional challenges to certain aspects of the Affordable Care Act, as well as recent efforts by the Trump administration to repeal or replace certain aspects of the Affordable Care Act. Since January 2017, President Trump has signed two Executive Orders and other directives designed to delay the implementation of certain provision of the Affordable Care Act or otherwise circumvent some of the requirements for health insurance mandated by the Affordable Care Act. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the Affordable Care Act. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the Affordable Care Act have been signed into law. The Tax Cuts and Jobs Act of 2017, or the Tax Act, includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the Affordable Care Act on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate." On January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain Affordable Care Act-mandated fees, including the so-called "Cadillac" tax on certain high cost employer-sponsored insurance plans, the annual fee imposed on certain health insurance providers based on market share, and the medical device excise tax on non-exempt medical devices. The Bipartisan Budget Act of 2018, or the BBA, among other things, amended the Affordable Care Act, effective January 1, 2019, to close the coverage gap in most Medicare drug plans, commonly referred to as the "donut hole." In July 2018, the Centers for Medicare & Medicaid Services, or CMS, published a final rule permitting further collections and payments to and from certain Affordable Care Act qualified health plans and health insurance issuers under the Affordable Care Act risk adjustment program in response to the outcome of federal district court litigation regarding the method CMS uses to determine this risk adjustment. On December 14, 2018, a Texas U.S. District Court Judge ruled that the Affordable Care Act is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. While the Texas U.S. District Court Judge, as well as the Trump administration and CMS, have stated that the ruling will have no immediate effect pending appeal of the decision.

Other legislative changes have been proposed and adopted since the PPACA was enacted. These changes include aggregate reductions to Medicare payments to providers of 2% per fiscal year pursuant to the Budget Control Act of 2011, which began in 2013, and due to subsequent legislative amendments to the statute, including the BBA, will remain in effect through 2027 unless additional Congressional action is taken. The American Taxpayer Relief Act of 2012, among other things, further reduced Medicare payments to several providers, including hospitals 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 in the United States of pharmaceutical pricing practices in light of the rising cost of prescription drugs and biologics. Such scrutiny has resulted in several recent congressional inquiries and proposed and enacted federal 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. For example, at the federal level, the Trump administration released a "Blueprint" to lower drug prices and reduce out of pocket costs of drugs that contains additional proposals to increase manufacturer competition, increase the negotiating power of certain federal healthcare programs, incentivize manufacturers to lower the list price of their products and reduce the out-of-pocket costs of drug products paid by consumers. On January 31, 2019, the U.S. Department of Health and Human Services Office of Inspector General proposed modifications to Federal Anti-Kickback Statute safe harbors which, among other things, will affect rebates paid by manufacturers to Medicare Part D plans, the purpose of which is to further reduce the cost of drug products to consumers. Although a number of these, and other proposed measures may require authorization through additional legislation to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs. At the state level, legislatures are also 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.

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

Foreign Regulation

In addition to regulations in the United States, we will be subject to a variety of foreign regulations governing clinical trials and commercial sales and distribution of our product candidates. Whether or not we obtain FDA approval for a product candidate, we must obtain approval from the comparable regulatory authorities of foreign countries or economic areas, such as the European Union, before we may commence clinical trials or market products in those countries or areas. The approval process and requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary greatly from place to place, and the time may be longer or shorter than that required for FDA approval.

Other Regulations

We are also subject to numerous federal, state and local laws relating to such matters as safe working conditions, manufacturing practices, environmental protection, fire hazard control, and disposal of hazardous or potentially hazardous substances. We may incur significant costs to comply with such laws and regulations now or in the future.

Corporate Information and Employees

Our principal corporate offices are located at 111 Oyster Point Boulevard, South San Francisco, California 94080 and our telephone number is (415) 365-5600. We were incorporated in December 2001 in Delaware and completed our initial public offering in September 2013.

As of December 31, 2018, we had 209 full-time employees and one part-time employee. Of these employees, 121 were primarily engaged in research and development activities and 56 have an M.D. or a Ph.D. degree.

On January 15, 2019, we implemented a corporate restructuring, or the restructuring, to focus our resources on our clinical development and late-stage research programs. Pursuant to the restructuring, we eliminated 41 employee positions, primarily in the areas of research, pathology and manufacturing. Following the restructuring, as of January 23, 2019, we had 168 full-time employees and no part-time employees. Of these employees, 81 were primarily engaged in research and development activities and 40 have an M.D. or a Ph.D. degree.

Available Information

Our website address is www.fiveprime.com. We make available on our website, free of charge, this Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and our Current Reports on Form 8-K and any amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, 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 SEC maintains a website that contains reports, proxy and information statements and other information regarding our filings at www.sec.gov. The information found on our website is not incorporated by reference into this Annual Report on Form 10-K or any other report we file with or furnish to the SEC.

Item 1A. Risk Factors

This Annual Report on Form 10-K contains forward-looking information based on our current expectations. Because our business is subject to many risks and our actual results may differ materially from any forward-looking statements made by or on behalf of us, this section includes a discussion of important factors that could affect our business, operating results, financial condition and the trading price of our common stock. You should carefully consider these risk factors, together with all of the other information included in this Annual Report on Form 10-K as well as our other publicly available filings with the SEC.

Risks Related to Our Business and Industry

If we are unable to advance additional product candidates into clinical development or identify or validate additional drug targets, or if we experience significant delays in doing any of the foregoing, our business will be materially harmed.

We have invested a significant portion of our efforts and financial resources in the identification and validation of new targets for protein therapeutics and the identification and preclinical development of product candidates directed to these targets or in these target pathways. We are clinically developing our bemarituzumab, FPA150, FPT155 and cabiralizumab product candidates. Our ability to generate product revenues, which we do not expect to occur for many years, if ever, will depend heavily on our and our partners' ability to successfully develop these product candidates and our ability to identify and validate new targets and product candidates and identify and advance preclinical product candidates into and through clinical development. The outcome of preclinical studies of our product candidates may not predict the success of such product candidates in clinical trials. Moreover, preclinical results regarding a product candidate are often susceptible to varying interpretations and analyses and may not translate into similar results when the product candidate is tested clinically in humans. Many companies have believed their product candidates performed satisfactorily in preclinical and early clinical studies, but such product candidates have nonetheless failed during clinical development. Our inability to successfully complete preclinical or clinical development of our product candidates could cause us to incur additional costs, delay or prevent our ability to advance product candidates into clinical development or commercialization, or impair our ability to receive development, regulatory, commercialization or sales milestone payments from our current or future collaboration partners, or to generate and receive royalties on product sales or product revenues from our current or future collaboration partners.

If clinical trials of our product candidates fail to demonstrate safety and efficacy to the satisfaction of regulatory authorities or do not otherwise produce meaningfully positive results, we may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of our product candidates.

Before obtaining marketing approval from regulatory authorities for the sale of our product candidates, we or our partners must conduct extensive clinical trials to demonstrate the safety and efficacy of such product candidates in humans. Clinical testing is expensive and difficult to design and implement, generally takes many years to complete and is uncertain as to outcome. A failure of one or more clinical trials can occur at any stage of testing. The outcome of preclinical studies and early clinical trials may not predict the success of later clinical trials and interim results of a clinical trial do not necessarily predict final results. A number of companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in advanced clinical trials due to lack of efficacy or unacceptable safety profiles of their product candidates, notwithstanding promising results in earlier trials. Even though we have already generated results from certain preclinical studies and clinical trials of our product candidates, we do not know whether the clinical trials of those of our product candidates that we or our partners may conduct will demonstrate adequate efficacy and safety to result in regulatory approval to market any of these product candidates in any particular jurisdiction or jurisdictions. If later-stage clinical trials for one or more of our product candidates do not produce favorable results, we or our partners may be unable to obtain regulatory approval for such product candidates.

Delays in clinical testing will delay the commercialization of our product candidates, increase our costs and harm our business.

We do not know whether any of our clinical trials will begin as and when planned, will need to be amended or restructured or will be completed on schedule, or at all. Our product development costs will increase if we experience delays in clinical testing. Significant clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize our product candidates or could allow our competitors to bring products to market before we do, which would impair our ability to successfully commercialize our product candidates and may harm our business, results of operations and prospects. Events which may result in a delay in or unsuccessful completion of clinical development include:

- delays in reaching an agreement with or failure to obtain authorization from the U.S. Food and Drug Administration, or FDA, or other comparable regulatory authorities, and institutional review boards, or IRBs;
- imposition of a clinical hold following an inspection of our manufacturing or clinical trial operations, including clinical trial sites, by the FDA or other comparable regulatory authorities, or a decision by the FDA, other comparable regulatory authorities, IRBs or us, or a recommendation by a data safety monitoring board, to suspend or terminate a clinical trial at any time for safety or other reasons;
- delays in reaching, or the inability to reach, agreement on acceptable terms with prospective clinical research organizations, or CROs, clinical trial sites, laboratory service providers, companion diagnostic development partners, CMOs and other service providers we may engage to support the conduct of our clinical trials or eventual commercialization of our products;
- deviations from the clinical trial protocol by clinical trial sites or investigators or failure to conduct a clinical trial in accordance with regulatory requirements;
- failure of third parties, such as CROs, to satisfy their contractual duties or meet expected deadlines;
- delays in the testing, validation and manufacturing of product candidates and the delivery of these product candidates to clinical trial sites;
- in the case of clinical trials testing combination treatment of our product candidates with third-party drug products, delays in procuring such third-party drug products and the delivery of such third-party drug products to clinical trial sites, or the inability to procure such third-party drug products at all;
- for clinical trials in selected patient populations, delays in identifying and auditing central or other laboratories that develop or use assays or tests to identify eligible patients for our clinical trials, or delays in the validation or transfer of such assays or tests to such laboratories;
- with respect to patients in any of our clinical trials, delays in completing their participation in any such clinical trial or returning for post-treatment follow-up;
- the occurrence of side effects, disease progression or other events requiring patients to drop out of one or more of our clinical trials before completion;
- withdrawal of one or more clinical trial sites from our clinical trials, including as a result of any clinical trial site investigator ceasing his or her affiliation with any such site, changes to any applicable standard of care or the ineligibility of any such site to participate in our clinical trials;
- administrative actions or changes in government policies, laws or regulations affecting any aspect of the conduct of our clinical trials; or
- lack of adequate funding to continue our clinical trials.

For example, we are conducting our Phase 3 registrational trial of bemarituzumab in combination with 5-fluorouracil (5-FU), leucovorin, and oxaliplatin, a standard of care chemotherapy regimen known as mFOLFOX6, as front-line treatment for patients with gastric or gastroesophageal junction, or GEJ, cancer with tumors that overexpress FGFR2b, or our FIGHT trial, at over 200 clinical trial sites in North America, Europe and Asia. Our ability to conduct the FIGHT trial in accordance with our timelines will depend on our ability to timely contract with, initiate and enroll patients at each of these clinical trial sites. We have not undertaken a trial of this scale as an organization. Delays in contracting with or initiating or conducting our FIGHT trial at one or more of these clinical trial sites may delay our ability to fully enroll the trial in accordance with our projected timelines and may delay any potential approval for or commercialization of bemarituzumab.

Moreover, we are conducting the FIGHT trial in China in collaboration with Zai Lab (Shanghai) Co., Ltd., or Zai Lab. Given the greater potential patient population in China, we believe that our ability to enroll patients at clinical trial sites in China will reduce the overall time to fully enroll the FIGHT trial and will therefore allow us to advance and complete the FIGHT trial within a shorter time period. However, Zai Lab's ability to initiate and conduct the FIGHT trial in China depends on Zai Lab's and our ability to comply with the government policies, laws and regulations applicable to conducting clinical trials in China. The government policies, laws and regulations in China are evolving rapidly and changes to these policies, laws and regulations are difficult to predict. If any such government policies, laws or regulations in China evolve in a way that makes it more difficult or inefficient for us or Zai Lab to conduct our FIGHT trial in China, we may experience delays in initiating or conducting our FIGHT trial at clinical trial sites in China and in fully enrolling trial, which would delay our ability to obtain approval for and commercialize bemarituzumab.

In addition, in order to successfully initiate and conduct the FIGHT trial in each country where the trial is taking place, we must obtain sufficient clinical supply of each component of mFOLFOX6 to administer the mFOLFOX6 regimen to patients in each such country. If we have difficulty obtaining or are unable to obtain sufficient supply of any component of the mFOLFOX6 regimen in any country, we may experience delays in initiating or conducting our FIGHT trial at clinical trial sites in such country and in timely enrolling the trial, which would delay our ability to obtain approval for and commercialize bemarituzumab.

If we or our partners are unable to timely complete clinical development for any of our product candidates, we may incur additional costs and our ability to achieve development, regulatory, commercialization or sales milestones or to generate and receive royalties on product sales and product revenues for any such product candidate may be impaired.

If we or our partners are unable to timely enroll patients in our clinical trials, we will be unable to complete these trials on a timely basis.

The timely completion of clinical trials largely depends on the rate of patient enrollment. Many factors affect the rate of patient enrollment, including:

- the size and nature of the patient population;
- the number and location of clinical trial sites;
- competition with other companies for clinical trial sites or patients;
- the eligibility and exclusion criteria for the clinical trial;
- the design of the clinical trial;
- the ability to obtain and maintain patient consents;
- the risk that enrolled patients will drop out before completion of the trial; and
- clinicians' and patients' perceptions as to the potential advantages of the product candidate being studied in relation to other available therapies, including any new drugs that may be approved for the indications we are investigating.

We face and will continue to face significant competition in recruiting patients for our and our partners' current and future clinical trials, and we or our partners may be unable to timely enroll the patients necessary to complete clinical trials on a timely basis or at all.

For example, we are conducting our FIGHT trial to evaluate bemarituzumab in gastric and GEJ cancer patients whose tumors overexpress FGFR2b or amplify the *FGFR2* gene. We believe using both an immunohistochemistry-, or IHC-, based diagnostic and a circulating tumor DNA, or ctDNA, blood-based companion diagnostic to select patients with gastric and GEJ cancer whose tumors overexpress FGFR2b or amplify the *FGFR2* gene should increase the likelihood of identifying eligible patients and the probability of success in our FIGHT trial. However, our selection criteria limit the overall number of patients eligible for enrollment in the trial. Also, if our assumptions regarding the percentage of patients with tumors that overexpress FGFR2b or amplify the *FGFR2* gene that we expect to identify for inclusion in the FIGHT trial are higher than we actually observe, the FIGHT trial will take longer to enroll, we will incur higher costs and the commercial potential for bemarituzumab would be adversely affected. Additionally, Astellas Pharma Inc., or Astellas, is conducting two Phase 3 clinical trials of its zolbetuximab (IMAB362, claudiximab) anti-Claudin 18.2 antibody in combination with mFOLFOX6 or capecitabine and oxaliplatin, or CAPOX, as front-line treatment in patients with HER2-negative, Claudin 18.2-positive gastric and GEJ cancer. If Astellas continues the clinical development of zolbetuximab in gastric and GEJ cancer, we may compete with Astellas for patient enrollment in this patient population, which may adversely impact the rate of patient enrollment in and the timely completion of our FIGHT trial.

We may not successfully identify, test, develop or commercialize our current or future product candidates, which may force us to terminate our development efforts for one or more programs.

The success of our business depends primarily upon our ability to discover, develop and commercialize protein therapeutics, which we may develop ourselves or in-license from third parties, and identify and validate new protein therapeutic targets, including through the use of our discovery platform. Our efforts to discover and preclinically develop potential new protein therapeutic candidates may initially show promise, yet fail to yield product candidates for clinical development or candidates that we successfully clinically develop and ultimately commercialize for numerous reasons, including the following:

- our research methodology, including our screening technology, may not successfully identify medically relevant protein therapeutic targets or potential product candidates;
- our discovery platform often identifies novel, untested targets that may be challenging to validate because of the novelty of the target or that we may be unable to validate at all after further research;
- product manufacturing difficulties may limit product yield or produce undesirable product characteristics that increase the cost of goods, cause delays or make our product candidates unmarketable;
- third parties on whom we may rely to generate antibody or other product candidates may fail to produce candidates that we can successfully validate or that have the characteristics necessary develop into marketable product candidates;
- our product candidates may cause adverse effects in patients, even after successful initial toxicology studies or early-stage clinical trials, which may make our product candidates unsuitable for approval or otherwise unmarketable;
- our product candidates may have an unacceptable safety profile or otherwise fail to provide a meaningful benefit to patients; or
- our collaboration partners may change their development profiles or plans for our partnered product candidates or abandon a therapeutic area for or the development of a partnered product candidate.

The occurrence of any of these events may force us to abandon our development efforts for one or more programs, which would have a material adverse effect on our business, operating results and prospects and could potentially cause us to cease operations. Research programs that are designed and conducted to identify new product targets and candidates require substantial technical, financial and human resources. We may focus these resources and our efforts on potential discovery efforts, programs or product candidates that ultimately prove to be unsuccessful.

We and our product candidates are subject to a multitude of manufacturing risks, any of which could substantially increase our costs and limit supply of such product candidates.

The process of manufacturing our product candidates is complex and subject to a number of risks, including the following:

- The biologics manufacturing process is susceptible to product loss due to contamination, equipment failure, improper installation or operation of equipment or vendor or operator error leading to manufacturing process deviations. Even minor deviations from specified manufacturing processes could result in reduced production yields, product defects and other supply disruptions. If microbial, viral or other contaminations are discovered in our products or in the manufacturing facilities in which our products are made, such manufacturing facilities may need to be closed for an extended time to investigate and remediate the contamination.
- The manufacturing facilities in which our products are made, and their ability to successfully and timely manufacture our products, could be adversely affected by equipment failures, labor and raw material shortages, natural disasters, power failures and numerous other factors.
- Any adverse developments affecting manufacturing operations for our products may result in shipment delays, inventory shortages, lot failures, product withdrawals or recalls, or other interruptions in the supply of our products to clinical trial sites. We may also have to take inventory write-offs and incur other charges and expenses for products that fail to meet specifications, or to undertake costly remediation efforts or seek more expensive manufacturing alternatives.

Certain raw materials necessary for the manufacture of our products, such as growth media, resins and filters, are sourced from a single supplier. We do not have agreements in place that guarantee our supply or the price of these raw materials. Any significant delay in the acquisition or decrease in the availability or significant increase in the price of these raw materials could considerably delay the manufacture of our product candidates, which could adversely impact the timing of any planned clinical trials or the regulatory approval of those product candidates.

We have process development and small-scale preclinical manufacturing capabilities. We do not have and we do not have current plans to acquire or develop the facilities or capabilities to manufacture bulk drug substance or filled drug product for use in human clinical trials or commercialization. In the past we have engaged, and we expect in the future to engage, CMOs for the manufacture of bulk drug substance and drug product for our clinical trials and additional third parties for our supply chain. Any problems we experience with any of these third parties could delay the manufacturing of our product candidates or the progress of our clinical trials, which could harm our results of operations.

For example, Bristol-Myers Squibb Company, or BMS, has the exclusive right to manufacture cabiralizumab under our cabiralizumab collaboration agreement with BMS. Under this agreement, BMS will supply us with cabiralizumab, at its cost and expense, for our use in the conduct of our clinical trial evaluating cabiralizumab in combination with *Opdivo* in multiple tumor types and will supply us with cabiralizumab, in exchange for a service fee, for our conduct of our independent development activities with respect to cabiralizumab.

We have not contracted with alternate suppliers in the event that our current CMOs are unable to scale production or if we otherwise experience any problems with these CMOs. If we are unable to arrange for alternative third-party manufacturing sources, or are unable to do so on commercially reasonable terms or in a timely manner, we may be delayed in the development of our product candidates.

Our reliance on third-party manufacturers subjects us to risks to which we would not be subject if we manufactured product candidates internally, including potential failure of any such third party to abide by regulatory and quality assurance requirements, breach of the manufacturing agreement by such third party due to factors beyond our control (including the third party's failure to manufacture our product candidates or any products we may eventually commercialize in accordance with our specifications) and termination of or a decision not to renew such agreement by such third party, based on its own business priorities, at a time when our finding and retaining a replacement manufacturer may be costly or damaging to our business.

The regulatory approval processes of the FDA and comparable foreign regulatory authorities are lengthy, time-consuming and inherently unpredictable. Our inability to obtain regulatory approval for our product candidates would substantially harm our business.

The FDA and comparable foreign regulatory authorities extensively and rigorously regulate and evaluate the testing, manufacture, distribution, advertising and marketing of drug products prior to granting marketing approvals with respect to such products. This approval process generally requires, at minimum, testing of any product candidate in preclinical studies and clinical trials to establish its safety and effectiveness, and confirmation by the FDA and comparable foreign regulatory authorities that any such product candidate, and any parties involved in its testing, development and manufacturing, complied with current Good Manufacturing Practices, or GMP, current Good Laboratory Practices, or GLP, and current Good Clinical Practices, or GCP, regulations, standards and guidelines during such testing and manufacturing. The time required to obtain approval to market a product candidate from the FDA or any comparable foreign regulatory authority is unpredictable but typically takes many years following the commencement of clinical trials and depends on numerous factors, including the conduct of testing, development and manufacturing activities with respect to such product candidate and the substantial discretion of the applicable regulatory authorities. In addition, approval policies, regulations, or the type and amount of clinical data necessary to obtain approval may change during the course of a product candidate's clinical development and may vary among jurisdictions. We have not obtained regulatory approval for any of our product candidates and it is possible that none of our existing product candidates or potential future product candidates will ever obtain regulatory approval.

Any of our product candidates could fail to receive regulatory approval from the FDA or a comparable foreign regulatory authority for many reasons, including:

- the FDA's or such comparable foreign regulatory authority's disagreement with the design or implementation of our clinical trials testing any such product candidate;
- our failure to demonstrate that a product candidate is effective for its proposed indication and has an acceptable safety profile;
- our failure to demonstrate that a product candidate's clinical and other benefits outweigh its safety risks;
- the failure of our clinical trial data for a product candidate to meet the level of statistical significance required for regulatory approval;
- the FDA's or such comparable foreign regulatory authority's disagreement with our interpretation of data from preclinical studies or clinical trials testing a product candidate;
- the insufficiency of our clinical trial data for a product candidate to support the submission and filing of a Biologic License Application or other regulatory submission or to obtain regulatory approval for such product candidate;
- our failure to obtain approval from the FDA or such comparable foreign regulatory authority for the manufacturing or testing processes or facilities of CMOs or CROs with whom we contract for clinical and commercial product supply or preclinical or clinical testing; or
- changes in the applicable standard of care or the FDA's or such comparable foreign regulatory authority's approval policies or regulations that render our preclinical and clinical data for a product candidate insufficient for regulatory approval.

The FDA or a comparable foreign regulatory authority may require more information to support approval of a product candidate, including additional preclinical or clinical data, which may delay or prevent approval and our commercialization plans, or result in our decision to abandon the development program with respect to such product candidate. For example, given the greater potential patient population in China, we plan to enroll a substantial number of the patients in our Phase 3 FIGHT trial at clinical trial sites in China in order to reduce the overall time to fully enroll the FIGHT trial and potentially advance and complete the FIGHT trial within a shorter time period. However, we are currently unable to provide regulatory authorities with data that demonstrate that patients participating in the FIGHT trial at clinical trial sites in China are representative of the general patient population and will respond to bemarituzumab the same way as other patient populations. If we obtain a significant portion of our positive clinical data from clinical trial sites in China as compared to data from clinical trial sites located elsewhere, and an analysis of the data from Chinese patients suggest that other patient populations may not have similar outcomes, the FDA and comparable foreign regulatory authorities may determine that the data we observe in Chinese patients are not sufficient to support regulatory approval for bemarituzumab for the general patient population and may require more clinical data from other patient populations to support regulatory approval for bemarituzumab. This could significantly delay or prevent our ability to timely obtain approval for and to commercialize bemarituzumab.

In addition, if we were to obtain approval for any of our product candidates, regulatory authorities may approve any such product candidate for fewer or more limited indications than we request, may grant approval contingent on the performance of costly post-marketing clinical trials or risk evaluation and mitigation strategy, or REMS, drug safety programs, or may approve a product candidate with a label that does not include the labeling claims necessary or desirable for the successful commercialization of that product candidate.

Our product candidates may cause undesirable side effects or have other properties that could delay or prevent their regulatory approval, limit the commercial profile of an approved product, or result in significant negative consequences following any marketing approval.

Our product candidates may cause undesirable side effects in patients, which could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or other comparable foreign regulatory authority or otherwise limit the commercial potential of any such product candidate. Our clinical trial results could reveal an unacceptable severity or prevalence of side effects or unexpected characteristics. In such an event, we may elect to suspend or terminate our clinical trials or the FDA or comparable foreign regulatory authorities could order us to cease our clinical trials or deny approval of our product candidates for any or all targeted indications. Drug-related side effects could affect patient recruitment, cause enrolled patients to drop out of a clinical trial and result in product liability claims. Any of these occurrences may significantly harm our business, financial condition and prospects.

Additionally, if one or more of our product candidates receives marketing approval, and we or others later identify undesirable side effects caused by any such product, numerous potentially significant negative consequences could result, including:

- we may suspend marketing of, or withdraw or recall, such product;
- regulatory authorities may withdraw approvals of such product;
- regulatory authorities may require additional warnings on the label for such product;
- regulatory authorities may issue safety alerts, Dear Healthcare Provider letters, press releases or other communications containing warnings about such product;
- regulatory authorities may require the establishment or modification of REMS or a similar strategy that may, for instance, restrict distribution of such product and impose burdensome implementation requirements on us;
- regulatory authorities may require that we conduct post-marketing studies;
- we could be sued and held liable for harm caused to patients; and
- our reputation may suffer.

Any of these events could prevent us from achieving or maintaining marketing approval for or acceptance for a product candidate or otherwise materially harm the commercial prospects for such product, if approved, and could significantly harm our business, results of operations and prospects.

Certain of our product candidates, including bemarituzumab and FPA150, are expected to be effective only in certain selected patient populations. If we are unable to successfully develop and obtain FDA approval for companion diagnostics for these product candidates, or experience significant delays in doing so, we may not obtain marketing approval for such product candidates or realize their full commercial potential.

Certain of our current product candidates, including bemarituzumab and FPA150, may be effective only in selected patient populations. For any such product candidate, we expect that the FDA and comparable foreign regulatory authorities may require the development and regulatory approval of at least one companion diagnostic as a condition to approving such product candidate for use in patients within the selected patient population. We do not have experience in or capabilities for developing or commercializing companion diagnostics and have depended and will continue to depend on the sustained cooperation and effort of our third-party diagnostic development collaborators to perform these functions.

For example, we are developing bemarituzumab to treat a subset of patients with gastric or GEJ cancer whose tumors overexpress FGFR2b. We have developed, in collaboration with third-party diagnostic development partners, both an IHC-based assay and a ctDNA blood-based assay to identify gastric and GEJ cancer patients with FGFR2 overexpression or *FGFR2* gene amplification who may benefit from treatment with bemarituzumab. We are using both companion diagnostics concurrently to more effectively screen patients for participation in the FIGHT trial. In addition, we are developing FPA150 to treat patients with a variety of cancers whose tumors overexpress the B7-H4 protein. We have developed, in collaboration with a third-party diagnostic development partner, an IHC-based assay for use in clinical trials to identify patients whose tumors overexpress B7-H4. We plan to use this IHC-based assay in the Phase 1b portion of our Phase 1a/1b clinical trial of FPA150.

Companion diagnostics are subject to regulation by the FDA and comparable foreign regulatory authorities as medical devices and may require separate regulatory approval prior to commercialization, which could delay their development and harm our business. For example, if we or our collaboration partners are unable to obtain any necessary regulatory approvals for our companion diagnostics for bemarituzumab or FPA150, or experience delays in doing so, we may suffer significant negative consequences, including:

- bemarituzumab or FPA150, as applicable, may not receive marketing approval if its safe and effective use depends on use of a companion diagnostic; or

- we may not realize the full commercial potential of bemarituzumab or FPA150 if, among other reasons, we are unable to appropriately identify patients with overexpression of FGFR2b or B7-H4, as applicable.

The occurrence of any of these events would harm our business, possibly materially.

Even if our product candidates receive regulatory approval, they may face future development and regulatory difficulties, which may inhibit our ability to commercialize our products and generate revenue.

Even if we obtain regulatory approval for a product candidate in a particular jurisdiction, the product would be subject to ongoing requirements by the FDA or applicable comparable foreign regulatory authorities governing such product's manufacture, quality control, further development, labeling, packaging, storage, distribution, safety surveillance, import, export, advertising, promotion, recordkeeping and reporting of safety and other post-market information. The FDA and comparable foreign regulatory authorities will continue to closely monitor the safety profile of any product even after approval. If the FDA or any comparable foreign regulatory authority becomes aware of new safety information after approval of any of our product candidates, it may require labeling changes or establishment of a REMS or similar strategy, impose significant restrictions on the product's indicated uses or marketing, or impose ongoing requirements for post-approval studies or post-market surveillance, which may be costly.

In addition, drug product manufacturers and their facilities are subject to continual review and periodic inspections by the FDA and other regulatory authorities to evaluate compliance with GMP and GLP regulations and standards. If we or a regulatory authority discover previously unknown problems with one of our product candidates, such as side effects or adverse events of unanticipated severity or frequency, or problems with the facility where such product candidate is manufactured, a regulatory authority may impose restrictions on that product, the manufacturing facility or us, including requiring recall or withdrawal of such product from the market or suspension of manufacturing. If we, our product candidates or the manufacturing facilities for our product candidates fail to comply with applicable regulatory requirements, a regulatory authority may:

- issue warning letters or untitled letters;
- mandate modifications to promotional materials or require us to provide corrective information to healthcare practitioners;
- require us to enter into a consent decree, which may require payment of various monetary fines and reimbursement for inspection costs, impose due dates for specific actions by us, and impose penalties for non-compliance;
- seek an injunction or bring other court action to impose civil or criminal penalties or monetary fines;
- suspend or withdraw regulatory approval for our product candidates;
- suspend any ongoing clinical trials of our product candidates;
- refuse to approve pending applications or supplements to applications that we have filed with respect to our product candidates;
- suspend or impose restrictions on our or our manufacturing facilities' operations, including costly new manufacturing requirements; or
- seize or detain products, refuse to permit the import or export of products, or require us to initiate a product recall.

The occurrence of any event or penalty described above may limit or prevent our ability to commercialize our products and generate revenue.

Advertising and promotion of any product candidate that obtains approval in the United States will be heavily scrutinized by the FDA, the Department of Justice, the Department of Health and Human Services' Office of Inspector General, state attorneys general, members of Congress and the public. Violations of applicable laws and regulations, including promotion of our products for unapproved or off-label uses, may subject us to enforcement letters, inquiries, investigations and civil and criminal sanctions by the government. Similarly, comparable foreign regulatory authorities will heavily scrutinize advertising and promotion of any product candidate that obtains approval outside of the United States.

In the United States, engaging in the impermissible promotion of products for off-label uses can also subject a company to false claims litigation under federal and state statutes, which can lead to civil and criminal penalties and fines and agreements that materially restrict the manner in which such company promotes or distributes drug products. These false claims statutes include the Federal False Claims Act, which allows any individual to bring a lawsuit against a pharmaceutical company on behalf of the federal government alleging submission of false or fraudulent claims or that such company caused another entity or individual to present such false or fraudulent claims for payment by a federal program such as Medicare or Medicaid. If the government prevails in the lawsuit, the individual will receive a portion of any fines or settlement funds. Since 2004, Federal False Claims Act lawsuits against pharmaceutical companies have increased significantly in volume and breadth, leading to several substantial civil and criminal settlements involving fines exceeding $1.0 billion based on certain sales practices promoting off-label drug uses. This growth in litigation has increased the risk that a pharmaceutical company will have to defend against false claims actions, pay settlement fines or restitution, agree to comply with burdensome reporting and compliance obligations and be excluded from Medicare, Medicaid and other federal and state healthcare programs. If we do not lawfully promote any of our products that may receive marketing approval, we may become subject to such litigation and our inability to successfully defend the company in such litigation may material adversely affect our business, financial condition and results of operations.

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

Our failure to obtain regulatory approval in international jurisdictions would prevent us from marketing our product candidates outside the United States.

In order to market and sell our products in other jurisdictions, we or our collaboration partners must obtain separate marketing approvals and comply with numerous and varying regulatory requirements in those jurisdictions. The approval procedures vary among countries and can involve additional testing. The time required to obtain approval outside of the United States may differ substantially from that required to obtain FDA approval. The regulatory approval processes outside the United States generally include all the risks associated with obtaining FDA approval and may include additional risks that we cannot predict. In addition, in many countries outside the United States, we or our collaboration partners must secure product reimbursement approvals before regulatory authorities will approve a product for sale in that country. Obtaining foreign regulatory approvals and compliance with foreign regulatory requirements could result in significant difficulties and costs for us and could delay or prevent the introduction of our products in certain countries. We may not obtain foreign regulatory approvals for our product candidates on a timely basis, if at all.

For example, we are conducting our FIGHT trial for bemarituzumab in China in collaboration with Zai Lab and are relying on Zai Lab's ability to obtain approval for bemarituzumab in China, Taiwan, Hong Kong and Macau, or collectively, Greater China, from the China Food and Drug Administration. However, Zai Lab's ability to obtain approval in Greater China depends on Zai Lab's and our ability to comply with the government policies, laws and regulations applicable to conducting clinical trials and obtaining approval for and commercializing drug products in Greater China. The government policies, laws and regulations in China are evolving rapidly and future changes are difficult to predict. If any such government policies, laws or regulations evolve in a way that make it more difficult or inefficient for Zai Lab or us to clinically develop, obtain approval for or commercialize bemarituzumab in China, we may experience delays in initiating, conducting or completing the FIGHT trial at our clinical trial sites in China and in fully enrolling the FIGHT trial, which will delay our ability to obtain approval for and commercialize bemarituzumab.

Further, data and results from clinical trials conducted in one country may not be accepted by regulatory authorities in other countries, and regulatory approval in one country or by one regulatory authority outside the United States does not ensure approval by regulatory authorities in any other country or jurisdiction or by the FDA, while a failure or delay in obtaining regulatory approval for any of our product candidates in one country or by one regulatory authority may have a negative effect on the regulatory approval process in other countries or jurisdictions and may significantly diminish the commercial prospects of that product candidate, which may cause our business prospects to decline. Also, regulatory approval for any of our product candidates may be withdrawn in any country or jurisdiction. If we fail to comply with the regulatory requirements in international jurisdictions, we may not receive the necessary marketing approvals for our product candidates in these jurisdictions, our target market for these product candidates will be reduced, we may be unable to realize the full market potential of these product candidates and our business will be adversely affected.

We face substantial competition from third parties that may discover, develop or commercialize products before or more successfully than we do.

The biotechnology industry is intensely competitive and subject to rapid and significant technological change. We face worldwide competition from major pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies with respect to our current product candidates and will face such competition with respect to our future product candidates. Many of our competitors have significantly greater financial, technical and human resources than we do. Smaller and early-stage companies may also prove to be significant competitors, particularly through their collaborative arrangements with large and established companies.

Our competitors may obtain regulatory approval for their products more rapidly than we do or may obtain patent protection or other intellectual property rights that limit our ability to develop or commercialize our product candidates. Our competitors may also develop drugs that are more effective, more convenient, more widely accepted or less costly or have better safety profiles than our product candidates and may also be more successful in manufacturing and marketing their products than we are with respect to our product candidates.

We also currently and will in the future compete with other companies in recruiting and retaining qualified personnel, establishing clinical trial sites and enrolling patients in clinical trials, as well as in acquiring technologies complementary to, or necessary for, our research and development programs.

Although there are no approved therapies that specifically target the signaling pathways that our product candidates are designed to modulate or inhibit, there are numerous drugs that are currently approved to treat the same diseases or indications for which our product candidates may be useful and many of these currently-approved therapies act through mechanisms similar to those of our product candidates. Many of these approved drugs are well-established therapies or products and are widely accepted by physicians, patients and third-party payors. Some of these drugs are branded and subject to patent protection and others are available on a generic basis. Insurers and other third-party payors may also encourage the use of generic products or specific branded products. We expect that if our product candidates are approved, they will be priced at a significant premium over competitive generic, including branded generic, products. This may make it difficult for us to differentiate our products from currently-approved therapies, which may adversely impact our business strategy. In addition, many companies are developing new therapeutics and we cannot predict if and how the applicable standards of care will change as our product candidates progress through clinical development.

If cabiralizumab were approved for the treatment of cancer, it could face competition from products currently in development as single agents or in combination with anti-PD-1/PD-L1 agents or other immuno-oncology agents, including Amgen Inc.'s AMG 820 anti-CSF1R antibody, Syndax Pharmaceuticals Inc.'s SNDX-6352 anti-CSF1R monoclonal antibody, Pfizer Inc.'s, or Pfizer's, PD-0360324 CSF1 monoclonal antibody, Novartis' BLZ945 CSF1R-directed small molecule and lacnotuzumab (MCS110) CSF1 monoclonal antibody, Daiichi Sankyo's pexidartinib (PLX3397), PLX73086 and PLX7486 small molecule tyrosine kinase inhibitors, or TKIs, Array Biopharma Inc.'s ARRY-382 CSF1R small molecule TKI or Deciphera Pharmaceuticals LLC's DCC-3014 CSF1R small molecule TKI, each of which acts in the same pathway as cabiralizumab.

If bemarituzumab were approved for the treatment of front-line gastric or GEJ cancer, it could face competition from currently-approved and marketed products, including 5-fluorouracil, S-1, capecitabine, doxorubicin, cisplatin, oxaliplatin, carboplatin, paclitaxel, irinotecan, and docetaxel, as well as antibodies that bind to PD-1/PD-L1, including BMS's *Opdivo* monotherapy and *Opdivo* in combination with BMS's *Yervoy*® (ipilimumab) anti-CTLA-4 antibody, Merck & Co., Inc.'s *Keytruda*® (pembrolizumab), Merck KGaA/Pfizer's *Bavencio*® (avelumab), AstraZeneca UK Limited/MedImmune, LLC's *Imfinzi*® (durvalumab) anti-PD-L1 antibody, BeiGene Ltd.'s tislelizumab, Astellas's zolbetuximab and AstraZeneca UK Limited/MedImmune, LLC's tremelimumab anti-CTLA4 antibody.

If FPA150 were approved for the treatment of various cancers, it could face competition from currently-approved and marketed products, including cisplatin, carboplatin, gemcitabine, doxorubicin, paclitaxel, topotecan, *Avastin*® (bevacizumab), *Abraxane*® (paclitaxel protein-bound), *Xeloda*® (capecitabine), *Navelbine*® (vinorelbine), and *Halaven*® (eribulin mesylate); antibodies that bind to PD-1/PD-L1, including BMS's *Opdivo* monotherapy and *Opdivo* in combination with BMS's *Yervoy* (ipilimumab) anti-CTLA-4 antibody, Merck & Co., Inc.'s *Keytruda* (pembrolizumab), Merck KGaA/Pfizer's *Bavencio* (avelumab), Roche's *Tecentriq* (atezolizumab), AstraZeneca UK Limited/MedImmune, LLC's *Imfinzi* (durvalumab), and AstraZeneca UK Limited/MedImmune, LLC's tremelimumab anti-CTLA4 antibody; Immunomedics, Inc.'s sacituzumab govitecan (IMMU-132) anti-Trop-2-SN-38 ADC; small molecule poly ADP-ribose polymerase inhibitors, including AstraZeneca UK Limited's *Lynparza*® (olaparib), GlaxoSmithKline plc/Tesaro, Inc.'s *Zejula*® (niraparib), Clovis Oncology, Inc.'s *Rubraca*® (rucaparib), Pfizer's talazoparib and AbbVie Inc.'s veliparib; and other product candidates that are in or may enter clinical development, such as ImmunoGen, Inc.'s mirvetuximab soravtansine (IMGN853) ADC that targets folate receptor alpha.

We believe that our ability to successfully compete will depend on, among other things:

- the efficacy and safety profile of our product candidates, including relative to marketed products and product candidates undergoing development by third parties;
- the time it takes for our product candidates to complete clinical development and receive marketing approval;
- our and our partners' ability to commercialize any of our product candidates that receive regulatory approval;
- the price of our products, including in comparison to branded or generic competitors;
- whether coverage and adequate levels of reimbursement are available under private and governmental health insurance plans, including Medicare;
- our ability to establish, maintain and protect intellectual property rights related to our product candidates;
- our and our partners' ability to manufacture commercial quantities of any of our product candidates that receive regulatory approval; and
- acceptance of any of our product candidates that receive regulatory approval by physicians and other healthcare providers.

Our product candidates may not achieve the level of market acceptance among physicians, patients, healthcare payors and others in the medical community necessary for commercial success.

Even if our product candidates receive regulatory approval, they may not gain the level of market acceptance among physicians, patients, healthcare payors and others in the medical community necessary for commercial success. Commercial success of our product candidates also depends on coverage of and adequate reimbursement for these product candidates by third-party payors, including government payors, which may be difficult or time-consuming to obtain, may be limited in scope and may not be available or otherwise obtained in all jurisdictions in which we may seek to market our approved product candidates. The degree of market acceptance of any of our approved product candidates will depend on numerous factors, including:

- the efficacy and safety profile of the product candidate, as demonstrated in clinical trials;
- the acceptance of the product candidate as a safe and effective treatment by physicians, clinics and patients;
- the timing of market introduction of both the product candidate and products competitive to such product candidate;
- the clinical indications for which the product candidate is approved;
- the potential and perceived advantages of the product candidate over alternative treatments, including any similar generic treatments;
- the cost of treatment with the product candidate in relation to alternative treatments;
- the availability of coverage and adequate reimbursement and pricing by third parties and government authorities;
- the relative convenience and ease of administration of the product candidate;
- the frequency and severity of adverse events caused by the product candidate;
- the effectiveness of sales and marketing efforts with respect to the product candidate; and
- any unfavorable publicity relating to the product candidate.

If any product candidate is approved but does not achieve an adequate level of acceptance by physicians, hospitals, healthcare payors and patients, we may not generate or derive sufficient revenue from that product candidate, which could prevent us from becoming or remaining profitable.

Even if we commercialize one or more of our product candidates, these product candidates may become subject to unfavorable pricing regulations, third-party coverage and reimbursement practices or healthcare reform initiatives, which could harm our business.

The regulations that govern marketing approvals, pricing, coverage and reimbursement for new drug products vary widely from country to country. Current and future legislation may significantly change the approval requirements in ways that could involve additional costs and cause delays in obtaining approvals. Some countries require approval of the sale price of a drug before it can be marketed. In many countries, the pricing review period begins after marketing or product licensing approval is granted. In some foreign markets, prescription pharmaceutical pricing remains subject to continuing governmental control even after initial approval is granted. As a result, even if we obtain marketing approval for a product in a particular country, we may be subject to price regulations that delay the commercial launch of such product, possibly for lengthy time periods, which could negatively impact the revenues we generate from the sale of such product in that particular country. Adverse pricing limitations may hinder our ability to recoup our investment in one or more product candidates, even if such product candidates obtain marketing approval.

Our ability to successfully commercialize any products will also depend in part on the extent to which coverage and adequate reimbursement for these products and related treatments will be available from government health administration authorities, private health insurers and other organizations. Government authorities and other third-party payors, such as private health insurers and health maintenance organizations, determine which medications they will cover, establish reimbursement levels for medications and attempt to control costs by limiting such coverage and reimbursement levels. Increasingly, third-party payors are requiring that pharmaceutical companies provide such third-party payors with predetermined discounts from list prices and are challenging the prices charged for medications. We cannot be sure that coverage and reimbursement will be available for any product that we commercialize and, if reimbursement is available, what the level of reimbursement will be. Coverage and reimbursement may impact the demand for, or the price of, any product candidate for which we obtain marketing approval. If coverage and reimbursement for any product candidate for which we obtain marketing approval are not available or reimbursement is available only at limited levels, we may be unable to successfully commercialize any such product candidate.

There may be significant delays in obtaining coverage and reimbursement for newly approved drugs, and coverage may be more limited than the purposes for which the drug is approved by the FDA or any comparable foreign regulatory authority. Moreover, eligibility for coverage and reimbursement does not guarantee that a drug will be paid for in all cases or at a rate that covers our costs, including with respect to research, development, manufacture, sale and distribution. Interim reimbursement levels for new drugs, if applicable, may also not be sufficient to cover our costs and may only be provided on a temporary basis. Reimbursement rates may vary depending on the approved uses for the drug and the clinical setting in which it is used, may be based on reimbursement levels already set for lower cost drugs and may be incorporated into existing payments for other services. Net prices for drugs may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors and by any future relaxation of laws that presently restrict imports of drugs from countries where they may be sold at lower prices than in the United States. Our inability to promptly obtain coverage and profitable reimbursement rates from both government-funded and private payors for any of our approved products could have a material adverse effect on our operating results, our ability to raise capital needed to commercialize products and our overall financial condition.

Enacted and future legislation may increase the difficulty and cost of commercialization of our product candidates and affect the prices we may charge for such product candidates.

The United States and many foreign jurisdictions have enacted or proposed legislative and regulatory changes affecting the healthcare system that could prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to profitably sell any product candidate for which we obtain marketing approval.

In March 2010, Congress enacted the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively, the Affordable Care Act, which includes measures that have significantly changed the way healthcare is financed by both governmental and private insurers. Some of the provisions of the Affordable Care Act have yet to be implemented, and there have been judicial and congressional challenges to certain aspects of the Affordable Care Act. Since January 2017, President Trump has signed two Executive Orders and other directives designed to delay the implementation of certain provisions of the Affordable Care Act or otherwise circumvent some of the requirements for health insurance mandated by the Affordable Care Act. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the Affordable Care Act. While Congress has not passed comprehensive repeal legislation, two bills affecting the implementation of certain taxes under the Affordable Care Act have been signed into law. The federal Tax Cuts and Jobs Act of 2017, or the Tax Act, includes a provision that became effective on January 1, 2019 and repealed the tax-based shared responsibility payment imposed by the Affordable Care Act on certain individuals who fail to maintain qualifying health coverage for all or part of a year, which payment is commonly referred to as the "individual mandate." On January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain Affordable Care Act-mandated fees, including the so-called "Cadillac" tax on certain high cost employer-sponsored insurance plans, the annual fee imposed on certain health insurance providers based on market share, and the medical device excise tax on non-exempt medical devices. The Bipartisan Budget Act of 2018, or the BBA, among other things, amended the Affordable Care Act, effective January 1, 2019, to close the coverage gap in most Medicare drug plans, commonly referred to as the "donut hole." In July 2018, the Centers for Medicare & Medicaid Services, or CMS, published a final rule permitting further collections and payments to and from certain Affordable Care Act qualified health plans and health insurance issuers under the Affordable Care Act risk adjustment program in response to the outcome of federal district court litigation regarding the method CMS uses to determine this risk adjustment. On December 14, 2018, a Texas U.S. District Court Judge ruled that the Affordable Care Act is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. While the Texas U.S. District Court Judge, as well as the Trump administration and CMS, have stated that the ruling will have no immediate effect pending appeal of the decision, it is unclear how this decision, subsequent appeals, and other efforts to repeal and replace the Affordable Care Act will impact our business.

In addition, since the Affordable Care Act was enacted, other legislative changes have been proposed and adopted that may impact the extent to which we are able to successfully commercialize any of our product candidates that receive regulatory approval. For example, in August 2011, then-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 on Deficit Reduction did not achieve a targeted deficit reduction, which triggered the legislation's automatic reduction to several government programs. This includes aggregate reductions to Medicare payments to providers of, on average, two percent per fiscal year through 2027 unless Congress takes additional action. The American Taxpayer Relief Act of 2012, among other things, further reduced Medicare payments to several providers, including hospitals and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

Recently, there has been increasing legislative and enforcement interest in the United States with respect to specialty drug pricing practices. Specifically, there have been several recent U.S. congressional inquiries and proposed and enacted federal legislation designed to, among other things, increase transparency in drug pricing, reduce the cost of prescription drugs under Medicare, review the relationship between pricing and manufacturer patient programs and reform government program reimbursement methodologies for drugs. For example, at the federal level, the Trump administration released a "Blueprint" to lower drug prices and reduce out of pocket costs of drugs that contains additional proposals to increase manufacturer competition, increase the negotiating power of certain federal healthcare programs, incentivize manufacturers to lower the list price of their products and reduce the out of pocket costs of drug products paid by consumers. On January 31, 2019, the U.S. Department of Health and Human Services Office of Inspector General proposed modifications to Federal Anti-Kickback Statute safe harbors which, among other things, will affect rebates paid by manufacturers to Medicare Part D plans, the purpose of which is to further reduce the cost of drug products to consumers. Although a number of these, and other proposed measures may require authorization through additional legislation to become effective, Congress and the Trump administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs. At the state level, legislatures 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 product importation from other countries and bulk purchasing.

We expect that the healthcare reform measures that have been adopted and may be adopted in the future may result in more rigorous coverage criteria and in additional downward pressure on the price that we receive for any approved product, which could seriously harm our future revenues. Any reduction in reimbursement from Medicare or other government programs may result in a similar reduction in payments from private payors. The implementation of cost containment measures or other healthcare reforms may prevent us from being able to generate revenue, attain or maintain profitability or commercialize our products.

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

We may become subject to product liability lawsuits, which could cause us to incur substantial liabilities and limit commercialization of any products we may develop.

We face an inherent risk of product liability exposure related to the testing of our product candidates in human clinical trials and will face an even greater risk if we commercially sell any products that we may develop. Product liability claims may be brought against us by patients, including those enrolled in our clinical trials, healthcare providers or others that use, administer or sell our products. If we cannot successfully defend ourselves against claims that our product candidates or products that we may develop caused injuries, we could incur substantial liabilities. Regardless of merit or eventual outcome, product liability claims may result in:

- decreased demand for our product candidates or any products that we may develop;
- termination of clinical trials at particular sites or entire clinical trial programs;
- injury to our reputation and significant negative media attention;
- withdrawal of clinical trial participants from our clinical trials;
- significant costs to defend the related litigation;
- substantial monetary awards payable to patients, including those enrolled in our clinical trials;
- loss of revenue;

- diversion of management and scientific resources from our business operations; and
- inability to commercialize any products that we may develop.

We currently hold $10.0 million in clinical trial liability insurance coverage, which may not adequately cover all liabilities that we may incur. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liability that may arise. We intend to expand our product liability insurance coverage to include the sale of commercial products if we obtain marketing approval for one or more of our product candidates, but we may be unable to obtain product liability insurance on commercially reasonable terms for any of our products that have been approved for marketing. Large judgments have been awarded in class action lawsuits based on drugs that had unanticipated side effects. A successful product liability claim or series of claims brought against us, particularly if judgments exceed our insurance coverage, could decrease our cash and adversely affect our business.

Our relationships with healthcare providers, customers and third-party payors will be subject to applicable anti-kickback, fraud and abuse, transparency, privacy and other healthcare laws and regulations, violation of which could expose us to criminal sanctions, civil penalties, contractual damages, reputational harm, administrative burdens and diminished profits and future earnings.

Healthcare providers, physicians and third-party payors will play a primary role in the recommendation and prescription of any product candidates for which we obtain marketing approval. Our current and future arrangements with healthcare providers, third-party payors and customers may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we market, sell and distribute any of our products that have received marketing approval. Restrictions under applicable federal and state healthcare laws and regulations include the following:

- The federal Anti-Kickback Statute prohibits any person or entity from, among other things, knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward, or in return for, the referral of an individual for the furnishing or arranging for the furnishing, or the purchase, lease or order, or arranging for or recommending purchase, lease or order, of any good or service for which payment may be made under a federal healthcare program such as Medicare or Medicaid;
- The federal false claims laws, including the civil Federal False Claims Act (which can be enforced by private citizens through whistleblower or *qui tam* actions), impose civil and criminal penalties against individuals or entities for knowingly presenting, or causing to be presented, to the federal government claims for payment that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government;
- The federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, imposes criminal liability for knowingly and willfully executing a scheme to defraud any healthcare benefit program, knowingly and willfully embezzling or stealing any money or other assets of a healthcare benefit program, willfully obstructing a criminal investigation of a healthcare fraud offense or knowingly and willfully making false statements relating to healthcare matters;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, and their implementing regulations, also imposes obligations on certain healthcare providers, health plans and healthcare clearinghouses, known as covered entities, as well as their business associates that perform certain services involving the use or disclosure of individually identifiable health information, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;
- The federal Open Payments program requires manufacturers of drugs, devices, biologics or medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to report annually to CMS information related to "payments or other transfers of value" made to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, as well as ownership and investment interests held by such physicians and their immediate family members; and

- Analogous state and foreign laws and regulations impose similar restrictions to those described above, such as state anti-kickback and false claims laws, which may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers; state and foreign laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government or otherwise restrict payments that may be made to healthcare providers; state and foreign laws that require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures; state laws that require pharmaceutical companies to report information on the pricing of certain drugs, state and local laws that require the registration of pharmaceutical sales representatives, and state 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, or EU, General Data Protection Regulation, or GDPR, which imposes privacy and security obligations on any entity that collects or processes health data from individuals located in the EU and became enforceable on May 25, 2018. As well as complicating our compliance efforts, these laws could subject us to penalties or significant legal liability in the event that we fail to or are unable to comply. For example, significant non-compliance with the GDPR may result in the imposition of fines of up to 20 million euros or up to four percent of the annual global turnover of the responsible entity, whichever is greater.

Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices do not comply with current or future statutes, regulations or case law interpreting applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of these laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, imprisonment, exclusion from government-funded healthcare programs, such as Medicare and Medicaid, 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, reputational harm and the curtailment or restructuring of our operations. If any physician or other healthcare provider or entity with whom we expect to do business is found to have violated applicable laws, that person or entity may be subject to criminal, civil or administrative sanctions, including exclusions from government-funded healthcare programs.

We must attract and retain highly skilled employees to succeed.

We continue to grow our operations and capabilities as we advance our research and clinical activities, including the initiation of our Phase 1a/1b clinical trials of each of FPA150 and FPT155 in multiple cancers, the initiation of our Phase 3 FIGHT trial of bemarituzumab in gastric and GEJ cancer and advancement of our research and preclinical programs. Our success will depend in part on our ability to manage our growth, including increases to our headcount, effectively. To succeed, we must continue to recruit, develop, retain, manage and motivate qualified clinical, scientific, technical, general and administrative and management personnel while facing significant competition for experienced personnel. In January 2019, we announced that we were implementing a corporate restructuring, or the restructuring, to focus our resources on our clinical development and late-stage research programs. Pursuant to the restructuring, we eliminated 41 employee positions, representing approximately 20% of our then-current headcount. The restructuring could harm our ability to attract and retain qualified personnel. The restructuring could also result in reduced morale and productivity among our remaining personnel. Our inability or failure to successfully attract and retain qualified personnel, particularly at the management level, could adversely affect our ability to execute our business plan and harm our operating results. In particular, the loss of one or more of our executive officers could be detrimental if we cannot recruit suitable replacements in a timely manner. The competition for qualified personnel in the pharmaceutical field is intense and we may be unable to continue to attract and retain qualified personnel necessary for the development of our business or to recruit suitable replacement personnel.

Many of the other pharmaceutical companies with which we compete for qualified personnel have greater financial and other resources, different risk profiles and a longer history in the industry than we have. These companies may also provide more diverse opportunities and better or more chances for development or career advancement. Some of these characteristics may appeal more to high-quality candidates than what we offer. If we are unable to continue to attract and retain personnel, the rate at which we can discover, develop and advance current and future product candidates, and our success in doing so, will be limited and our business may be harmed.

Our operations are vulnerable to interruption by fire, earthquake, power loss, telecommunications failure, terrorist activity, political and economic instability in the countries in which we operate and other events beyond our control, which could harm our business.

Our computer and other systems, or those of our partners, CROs or other service providers, may fail or be interrupted, including due to fire, earthquake or other natural disasters, hardware, software, telecommunication or electrical failures or terrorism, which could significantly disrupt or harm our business or operations. For example, a computing system failure could result in the loss of research or preclinical or clinical data important to our discovery, research or development programs, interrupt the conduct of ongoing research or otherwise impair our ability to operate, which could result in delays in the advancement of our programs or cause us to incur costs to recover or reproduce lost data. Our facility is in a seismically-active region. We have not undertaken a systematic analysis of the potential consequences to our business and financial results from a major earthquake, fire, power loss, terrorist activity or other disaster and do not have a recovery plan for such disasters. In addition, we do not carry sufficient insurance to compensate us for actual losses that may occur from interruption of our business and any losses or damages incurred by us could harm our business. We maintain multiple copies of each of our protein libraries, most of which we maintain at our headquarters in South San Francisco, California. We maintain one copy of each of our protein libraries offsite in Central California. If both facilities were impacted by the same event, we could lose all our protein libraries, which would have a material adverse effect on our ability to discover new targets and develop any resulting product candidates.

We significantly depend on information technology systems to operate our business, and a cyber-attack or other significant disruption or breach of our information technology systems, or those of third parties on whom we may rely or with whom we share confidential information, could cause us significant financial, legal, regulatory, business and reputational harm.

We are increasingly dependent on information technology systems and infrastructure, including mobile technologies, to operate our business. In the ordinary course of our business, we collect, store, process and transmit large amounts of sensitive information, including intellectual property, proprietary business information, personal information and other confidential information belonging to us and to third parties. It is critical that we do so in a secure manner to maintain the confidentiality, integrity and availability of such sensitive information. We also outsource elements of our operations, including elements of our information technology infrastructure, to third-party vendors, and as a result, these vendors may or could have access to our computer networks or our confidential information. In addition, many of those vendors subcontract or outsource to other third parties some of their responsibilities under our agreements with such vendors. While all information technology operations are inherently vulnerable to inadvertent or intentional security breaches, incidents, attacks and exposures, the accessibility and distributed nature of our information technology systems, and the nature of the sensitive information stored on these systems, make such systems particularly vulnerable to internal and external attacks, both unintentional and malicious. Potential vulnerabilities can be exploited through inadvertent or intentional actions of our employees, third-party vendors, and business partners, or by malicious third parties. Attacks of this nature are increasing in their frequency, levels of persistence, sophistication and intensity and are being conducted by sophisticated and organized groups and individuals, including organized criminal groups, "hacktivists," nation-states and others, with a wide range of motives, including industrial espionage, and expertise. In addition to the extraction of sensitive information, such attacks could involve the deployment of harmful malware, ransomware, denial-of-service attacks, social engineering and other means to affect service reliability and threaten the confidentiality, integrity and availability of such information. In addition, the prevalent use of mobile devices increases the risk of the occurrence of data security incidents.

Data security incidents or other significant disruptions affecting our, our vendors' or our business partners' information technology systems could adversely affect our business operations and result in loss or misappropriation of, or unauthorized access to, use or disclosure of, or the prevention of access to, sensitive information, which could cause us financial, legal, regulatory, business and reputational harm. In addition, disruptions to our information technology systems could result in a material disruption of our development programs and our business operations. For example, the loss of clinical trial data from completed, current or future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce such data.

There is no way of knowing with certainty whether we have experienced any data security incidents that we have not yet discovered. While we have no reason to believe this to be the case, attackers have become sophisticated with respect to concealing their access to systems, and many companies whose information security systems have been attacked are not aware that they have been attacked. Any event that leads to unauthorized access, use or disclosure of personal information, including personal information of our employees or patients or investigators in our clinical trials, could disrupt our business, harm our reputation, compel us to comply with applicable federal, state or foreign breach notification laws, subject us to time-consuming, distracting and expensive litigation, regulatory investigations and oversight or mandatory corrective action, require us to verify the correctness of certain stored information, or otherwise subject us to liability under applicable laws, regulations and our contracts with third parties, including those that require us to protect the privacy and security of personal information. This could cause us to incur significant costs and expose us to significant legal and financial liability and reputational harm. In addition, if there is any failure or perceived failure by us or our vendors or business partners to comply with our or their privacy, confidentiality or data security-related legal or other obligations to third parties, or if there are any security incidents or other inappropriate access events that result in the unauthorized access, release or transfer of sensitive information, including personally identifiable information, we may be the subject of governmental investigations, enforcement actions, regulatory fines, litigation, or public statements against us by advocacy groups or others, third parties, including clinical trial sites, regulators or current and potential business partners, may lose trust in us, and we could be subject to claims by third parties that we have breached our privacy- or confidentiality-related obligations, which could materially and adversely affect our business and prospects. Moreover, data security incidents and other unauthorized access can be difficult to detect, and any delay in identifying such incidents or unauthorized access may lead to increased harm of the types described above. While we have implemented security measures intended to protect our information technology systems and infrastructure, there can be no assurance that such measures have prevented or will prevent service interruptions or security incidents.

Our employees, consultants, collaborators and other third parties may engage in misconduct or other improper activities, including insider trading and non-compliance with regulatory standards and requirements.

We are exposed to the risk that our employees, consultants, collaborators and other third parties with whom we interact may engage in fraudulent or illegal activity. Misconduct by these parties could include intentional, reckless or negligent conduct that violates United States and international laws and regulations, including laws requiring the true, complete and accurate reporting of financial and other information or data, drug manufacturing standards and healthcare fraud and abuse laws and regulations. In particular, sales, marketing and business arrangements in the healthcare industry, including the sale of pharmaceutical products, are subject to extensive laws and regulations intended to prevent fraud, misconduct, kickbacks, self-dealing and other abusive practices. Such laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. It is not always possible to detect, identify and deter misconduct by our employees or third parties, and the precautions we take to detect and prevent this activity may not be effective to control risks or losses or protect us from governmental investigations or other actions or lawsuits stemming from a failure to comply with such laws or regulations. If any such actions are instituted against us and we are not successful in defending ourselves or asserting our rights, such actions could result in the imposition of significant monetary fines or other sanctions, including the imposition of civil, criminal and administrative penalties, damages, imprisonment, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, additional reporting obligations and oversight if we become subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws, contractual damages, reputational harm, diminished profits and future earnings and curtailment of operations, any of which could adversely affect our ability to operate our business and our results of operations. Whether or not we are successful in defending against such actions or investigations, we could incur substantial costs, including legal fees, and divert the attention of management in defending ourselves against any such actions or investigations.

Risks Related to Our Dependence on Third Parties

BMS has exclusive global rights to develop and commercialize cabiralizumab, and Zai Lab has exclusive rights to develop and commercialize bemarituzumab in Greater China. BMS or Zai Lab's failure to timely develop or commercialize cabiralizumab or bemarituzumab, respectively, would have a material adverse effect on our business and operating results.

We granted BMS an exclusive global license to develop and commercialize cabiralizumab, subject to certain rights that we retained. Additionally, we granted Zai Lab an exclusive license to develop and commercialize bemarituzumab in Greater China, subject to certain rights that we retained in that territory. Either or both of our cabiralizumab collaboration with BMS and our bemarituzumab collaboration with Zai Lab may not be successful for various reasons, including the following:

- cabiralizumab or bemarituzumab may fail to demonstrate in clinical trials sufficient efficacy with an acceptable safety profile to support regulatory approval;
- BMS may be unable to manufacture sufficient quantities of cabiralizumab or Zai Lab may not be able to obtain from us or manufacture, as applicable, bemarituzumab, in a timely or cost-effective manner to support clinical development and potential commercialization;
- BMS or Zai Lab may be unable to obtain regulatory approval to commercialize cabiralizumab or bemarituzumab, respectively, even if preclinical and clinical testing is successful;
- BMS or Zai Lab may not succeed in obtaining sufficient reimbursement for cabiralizumab or bemarituzumab, respectively, if approved; and
- existing or future products or technologies developed by competitors may be safer, more effective, more conveniently delivered to patients or otherwise better accepted than cabiralizumab or bemarituzumab.

In addition, we could be adversely affected by:

- BMS's or Zai Lab's failure to timely perform their respective obligations under our collaboration agreements;
- BMS's or Zai Lab's failure to timely or fully develop or effectively commercialize cabiralizumab or bemarituzumab, respectively; or
- a material contractual dispute with BMS or Zai Lab.

The occurrence of any of the foregoing could adversely impact the likelihood and timing of any milestone payments we are eligible to receive under our collaboration agreements with BMS and Zai Lab and could have a material adverse effect on our business, results of operations and prospects and would likely cause our stock price to decline. In addition, reimbursement for our research and development expenses and other payments we may receive from BMS or Zai Lab may fluctuate from period to period, which may adversely affect our stock price.

Each of BMS and Zai Lab has the right to terminate its collaboration agreement with us without cause as well as upon the existence of certain conditions and, in some cases, BMS or Zai Lab may terminate on short notice. BMS or Zai Lab could each also pursue alternative potentially competitive products, therapeutic approaches or technologies as a means of developing treatments for the diseases targeted by cabiralizumab or bemarituzumab, respectively, during the course of our collaborations.

We may not succeed in establishing and maintaining additional development collaborations, which could adversely affect our ability to develop and commercialize product candidates.

A part of our strategy is to enter into product development collaborations, including collaborations with major biotechnology or pharmaceutical companies. We face significant competition in seeking appropriate development partners for additional product development collaborations and the negotiation process is time-consuming and complex. Moreover, we may not succeed in our efforts to establish a development collaboration or other alternative arrangement for any of our other existing or future product candidates and programs because our research and development pipeline may be insufficient, development of our product candidates and programs may be deemed to be too early in development for collaborative efforts or third parties may not view our product candidates as having the requisite potential to demonstrate safety and efficacy or otherwise become a marketable product if approved. Even if we are successful in our efforts to establish new development collaborations, the terms that we agree upon may not be favorable to us and we may not be able to maintain such development collaborations if, for example, development or approval of the applicable product candidate is delayed or sales of such product candidate, once approved, are disappointing. Any delay in entering into new development collaboration agreements related to our product candidates could delay the development and commercialization of such product candidates and reduce their competitiveness if they reach the market.

Moreover, if we fail to establish and maintain additional development collaborations related to our product candidates:

- the development of certain of our current or future product candidates may be delayed or terminated;
- our cash expenditures related to development of certain of our current or future product candidates would increase significantly and we may need to seek additional financing;
- we may be required to hire additional employees for which we have not budgeted, or otherwise develop expertise in areas in which we may have limited experience, such as sales and marketing; and
- we will bear all the risk related to the development of any such product candidates.

We rely on third-party CROs to conduct our clinical trials, and the unsatisfactory performance by such CROs may harm our business.

We rely on CROs to perform most of the activities related to the conduct of our clinical trials, including site identification, screening, preparation, training, initiation and monitoring, document preparation and coordination, program management and data management. However, we do not directly control the conduct, timing, expense or quality of the performance of these activities. The performance of our CROs will impact the quality and validity of our clinical trial results, which we rely on for business planning purposes and include in submissions to regulatory authorities. Although we contract with CROs to conduct most clinical trial-related activities, we remain responsible for ensuring that each of our clinical trials is conducted in accordance with the applicable protocol and legal and regulatory requirements. Our reliance on CROs does not relieve us of our legal and regulatory responsibilities with respect to our clinical trials.

We and our CROs are required to comply with current GCP, which are regulations, standards and guidelines enforced by the FDA, the Competent Authorities of the Member States of the European Economic Area and comparable foreign regulatory authorities, for all of our product candidates in clinical development. Regulatory authorities enforce GCP requirements through periodic inspections of clinical trial sponsors, principal investigators and clinical trial sites. If we or any of our CROs fail to comply with applicable GCP, the clinical data generated in our clinical trials may be deemed unreliable and the FDA or comparable foreign regulatory authorities may require us to perform additional clinical trials before approving our marketing applications. We cannot ensure that upon inspection by a given regulatory authority, such regulatory authority will determine that any of our clinical trials are being conducted in accordance with GCP requirements. In addition, we must conduct our clinical trials using drug product produced and developed in accordance with GMP and GLP requirements. Our failure, or the failure of our clinical trial sites or CROs or CMOs, to comply with applicable GCP, GMP and GLP may require us to repeat preclinical studies and clinical trials, which would delay the regulatory approval process.

Our CROs are not our employees. Except for remedies available to us in connection with our agreements with such CROs, we cannot control whether they devote sufficient time and resources to our ongoing clinical, nonclinical and preclinical programs. If our CROs do not successfully carry out their contractual duties or obligations or meet expected deadlines or if the quality or accuracy of the clinical data they obtain is compromised due to their 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 obtain regulatory approval for or successfully commercialize our product candidates. In such a case, our results of operations and the commercial prospects for our product candidates would be harmed, our costs could increase and our ability to generate revenues could be delayed or significantly limited.

Risks Related to Intellectual Property

If we are unable to obtain, maintain or protect intellectual property rights, we may not be able to compete effectively in our market.

Our success depends in significant part on our ability and the ability of our licensors and collaborators to obtain, maintain and defend patents and other intellectual property rights and to operate without infringing the intellectual property rights of others. We have filed numerous patent applications both in the United States and in foreign jurisdictions to obtain patent rights to inventions we have discovered. We have also licensed patent and other intellectual property rights to and from our partners and other third parties. Pursuant to some of these licenses, we have the right to prepare, file and prosecute patent applications and maintain and enforce the patents that are the subject of these licenses, whereas our partners or other third parties have such rights under other licenses.

In some circumstances, we may not have the right to control the preparation, filing and prosecution of patent applications or to maintain the patents covering technology that we license to or from third parties, including our collaborators, and we may have to rely on such third parties to fulfill these responsibilities. Consequently, these patents and applications may not be prosecuted and enforced in a manner consistent with the best interests of our business. If our current or future licensors, licensees or collaborators fail to establish, maintain or protect such patents and other intellectual property rights, such rights may be reduced or eliminated. If our licensors, licensees or collaborators are not fully cooperative or disagree with us as to the strategy for prosecution, maintenance or enforcement of any patent rights, such patent rights could be compromised.

The patent prosecution process is expensive and time-consuming. We and our current or future licensors, licensees or collaborators may not be able to prepare, file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. It is also possible that we or our licensors, licensees or collaborators will fail to file patent applications covering inventions made in the course of development and commercialization activities before a competitor or other third party files a patent application covering or publishes information disclosing a similar, independently-developed invention. Such competitor's or third party's patent application may hinder our or our licensors', licensees' or collaborators' ability to obtain patent protection for these inventions or may limit the scope of patent protection we or our licensors, licensees or collaborators may obtain.

The patent position of biotechnology and pharmaceutical companies generally is uncertain, involves complex legal and factual questions and is the subject of much litigation. As a result, the scope, validity, enforceability and commercial value of our and our current or future licensors', licensees' or collaborators' patent rights, as well as whether any patents will ever be issued based on applications claiming such patent rights, are uncertain. Our and our current or future licensors', licensees' or collaborators' pending and future patent applications may not result in issued patents that protect our technology or products, in whole or in part, or that effectively exclude others from commercializing similar or otherwise competitive technologies and products. The patent prosecution process may require us or our licensors, licensees or collaborators to narrow the scope of the claims of our pending and future patent applications, which may limit the scope of protection if patents issue from such applications. Our and our licensors', licensees' or collaborators' rights in the technology claimed in patent applications cannot be enforced against third parties using such technology unless and until a patent issues from such applications, and then only to the extent the issued claims effectively cover such technology.

Furthermore, because the amount of time required for the development, testing and regulatory review of new product candidates is lengthy, patents protecting such candidates might expire before or shortly after such candidates are approved for commercialization. As a result, our owned and licensed patent portfolios may not provide us with adequate protection against third parties seeking to commercialize products similar or identical to ours. We expect to request extensions of patent terms to the extent available in countries where we obtain issued patents. In the United States, the Drug Price Competition and Patent Term Restoration Act of 1984 permits, in certain cases, a patent term extension of up to five years beyond the expiration of the patent. However, there are no assurances that the FDA or any comparable foreign regulatory authority will grant such extensions, in whole or in part. If we fail to obtain patent term extensions for any reason, our competitors may launch their products earlier than might otherwise be anticipated.

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

Filing, prosecuting, enforcing and defending patents covering our product candidates in all countries throughout the world would be prohibitively expensive, and our or our licensors' or collaborators' intellectual property rights in some countries outside the United States may be less extensive than those in the United States. Moreover, the requirements for patentability in certain foreign countries, particularly developing countries, differ materially from those of the United States and such requirements also vary among foreign countries. For example, compared to the United States, China's patentability requirements are more stringent and may limit the scope of a patent's claims solely to the specific examples described in the patent. Therefore, it may be more difficult to obtain patent protection in certain countries relative to others.

The laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we and our licensors or collaborators may not be able to prevent third parties from using our and our licensors' or collaborators' inventions in certain countries outside the United States. In jurisdictions where we have not obtained patent protection, competitors may use our and our licensors' or collaborators' technologies to develop their own products. Competitors may also export infringing products to territories where we and our licensors or collaborators have patent protection but enforcement is not as strong or effective as in the United States. These products may compete with our product candidates and our and our licensors' or collaborators' patents or other intellectual property rights may not be sufficient to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems in certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property rights, particularly those relating to biopharmaceuticals, which could make it difficult for us and our licensors or collaborators to stop the infringement of our and our licensors' or collaborators' patents or marketing of competing products in violation of our and our licensors' or collaborators' proprietary rights generally. Proceedings to enforce our and our licensors' or collaborators' patent rights in foreign jurisdictions could result in substantial costs and divert our and our licensors' or collaborators' efforts and attention from other aspects of our business and could provoke third parties to assert counterclaims against us or our licensors or collaborators, which could put our and our licensors' or collaborators' patents at risk of being invalidated or interpreted narrowly. We or our licensors or collaborators may not prevail in any lawsuits that we or our licensors or collaborators initiate and, even if we or our licensors or collaborators prevail, the damages or other remedies awarded, if any, may not be commercially meaningful, particularly in light of any expenses incurred in connection with the initiation and conduct of such lawsuits.

Biosimilar drug manufacturers or other competitors may challenge the scope, validity or enforceability of our or our licensors' or collaborators' foreign patents, requiring us or our licensors or collaborators to engage in complex, lengthy and costly litigation or other proceedings outside of the United States. Biosimilar drug manufacturers may develop, seek approval for and launch biosimilar versions of our products. India, certain countries in Europe and certain developing countries, including China, 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 or collaborators may have limited remedies if compelled to grant a license to a third party, which could materially diminish the value of the applicable patents and limit our potential revenue opportunities. Accordingly, we may be unable to derive a significant commercial advantage from our and our licensors' or collaborators' intellectual property rights or our enforcement of those rights.

Changes to patent laws could diminish the value of patents in general, thereby impairing our ability to protect our rights in our product candidates.

The ability of a party to obtain and enforce patents in the biopharmaceutical industry is inherently uncertain, due in part to ongoing changes to applicable patent laws. Depending on decisions by Congress, the federal courts, and the U.S. Patent and Trademark Office, or USPTO, the laws and regulations governing patents could change in unpredictable ways and could weaken our and our licensors' or collaborators' ability to obtain new patents or to enforce existing or future patents.

For example, several of the Supreme Court's rulings in patent cases in recent years have either narrowed the scope of patent protection available under certain circumstances or weakened the rights of patent owners in certain situations. Therefore, there is increased uncertainty with regard to our and our licensors' or collaborators' ability to obtain patents in the future, as well as uncertainty with respect to the value that any of our patents may have once they have issued. Additionally, significant changes to the patent laws under the Leahy-Smith America Invents Act of 2011, or the Leahy-Smith Act, have affected how patent applications are prosecuted and challenged in the U.S. Those changes include implementation of a "first-to-file" system, effective in 2013, for determining entitlement to inventions claimed by more than one party, as well as creation of new administrative proceedings for challenging issued patents. As such, there is increased uncertainty with respect to both outcome and costs associated with the prosecution of patent applications and the enforcement or defense of issued patents controlled by us or our licensors or collaborators, which could have a material adverse effect on our business and financial condition.

Obtaining and maintaining patent protection requires compliance with various procedural, document submission, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated if we fail to comply with these requirements.

Patent holders are required to pay periodic maintenance and annuity fees to the USPTO and foreign patent agencies over the lifetime of any issued patent. The USPTO and various foreign patent agencies also require compliance with a number of procedural, documentary, fee payment and other similar requirements during the patent application and prosecution process. Non-compliance events that could result in abandonment or lapse of a patent or patent application include failure to respond to official communications within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents. 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 non-compliance can result in irrevocable abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. If we or our licensors or collaborators fail to maintain the patents and patent applications covering our product candidates, our competitors might be able to enter the market and compete with such product candidates, which would have a material adverse effect on our business.

We may need to protect or enforce our intellectual property through litigation or other proceedings, which could be expensive, time-consuming and unsuccessful and have a material adverse effect on the success of our business.

Third parties may infringe our or our licensors' or collaborators' patents or misappropriate or otherwise violate our or our licensors' or collaborators' intellectual property rights. In the future, we or our licensors or collaborators may initiate legal proceedings to enforce or defend our or our licensors' or collaborators' intellectual property rights or to protect our or our licensors' or collaborators' trade secrets. The outcome of such proceedings may determine or alter the validity or scope of intellectual property rights we own or control. Also, third parties may initiate legal proceedings, including litigation or administrative proceedings, against us or our licensors or collaborators to challenge the validity or scope of intellectual property rights we own or control. These proceedings can be expensive and time-consuming and many of our or our licensors' or collaborators' adversaries in these proceedings may have the ability to dedicate substantially greater resources to prosecuting these legal actions than we or our licensors or collaborators can. Accordingly, despite our or our licensors' or collaborators' efforts and the legitimacy of our or our licensors' or collaborators' arguments and positions in these proceedings, we or our licensors or collaborators may not be able to prevent third parties from infringing or misappropriating intellectual property rights we or our licensors or collaborators own or control, particularly in countries where the laws may not protect those rights as fully as in the United States. Litigation or administrative proceedings could result in substantial costs and diversion of management resources, which could harm our business and financial results. In addition, in a patent infringement proceeding, a court may decide that a patent owned by or licensed to us is invalid or unenforceable, or may refuse to impose monetary damages or enjoin the infringing party from using the technology at issue on the grounds that our or our licensors' or collaborators' patents do not cover the technology in question. Any legal proceeding involving one or more of our or our licensors' or collaborators' patents could put such patents at risk of being invalidated, held unenforceable or interpreted narrowly.

Derivation or interference proceedings in the United States or similar proceedings in other jurisdictions may be necessary to determine the priority of inventions with respect to our or our licensors' or collaborators' patents or patent applications. An unfavorable outcome in these proceedings could require us or our licensors or collaborators to cease using the technology covered by the applicable patents or patent applications and commercializing our product candidates or to attempt to license rights to such technology from the prevailing party. Our business could be harmed if the prevailing party does not offer us or our licensors or collaborators a license or offers a license on terms that are not commercially reasonable or are otherwise unfavorable to us. Even if we or our licensors or collaborators obtain a license, it may be non-exclusive, allowing our competitors to gain access to the same technologies licensed to us or our licensors or collaborators. In addition, if the breadth or strength of protection provided by our or our licensors' or collaborators' patents and patent applications is threatened, potential collaborators may be dissuaded from partnering with us with respect to the development or commercialization of our affected current or future product candidates. Even if we prevail in such a proceeding, such a proceeding may cause us to incur substantial costs and distract our management and other employees from our business and operations.

Furthermore, because intellectual property litigation and certain other legal proceedings require discovery, which may in some cases be substantial, there is a risk that our confidential information could be compromised by disclosure during the course of such proceedings. There could also be public announcements of the results of hearings, motions or other interim rulings or developments in the proceedings, and if securities analysts or investors perceive these results to be negative, the price of shares of our common stock may be materially adversely affected.

If we breach the agreements under which third parties have licensed intellectual property rights to us, we could lose the ability to use certain of our technologies or continue the development and commercialization of our product candidates.

Our commercial success depends upon our ability, and the ability of our licensors and collaborators, to discover and validate protein therapeutic targets and to identify, test, develop, manufacture, market and sell product candidates without infringing the proprietary rights of third parties. Third parties currently, and may in the future, hold intellectual property rights, including patent rights, that are important or necessary for the development or commercialization of our product candidates. As a result, we are a party to a number of licenses that are important to our business and expect to enter into additional licenses in the future. For example, we have entered into non-exclusive licenses with third parties, including BioWa, Inc. and Lonza Sales AG, to use their proprietary protein expression and cell line technologies, which are necessary to produce our product candidates, and non-exclusive licenses with each of the National Research Council of Canada and the Board of Trustees of the Leland Stanford Junior University to use materials and technologies that we use in the production of our protein library. If we fail to comply with the obligations under these license agreements, including payment and diligence terms, our licensors may have the right to terminate these agreements, in which event we may not be able to develop, manufacture, market or sell any product candidate that, or the development or manufacturing of which, is covered by these agreements and may face other contractual penalties. Such an occurrence could materially adversely affect the value of any product candidate being developed using technology licensed under any such agreement. Termination of, or reduction or elimination of our rights under, these agreements may require us to negotiate new or reinstated agreements, which may not be available to us on equally favorable or otherwise commercially reasonable terms, or at all, or cause us to lose our rights we had under the original agreements, including our rights to intellectual property or technology important to our development programs.

Third parties may initiate legal proceedings against us alleging that we infringe their intellectual property rights or we may initiate legal proceedings against third parties to challenge the validity or scope of intellectual property rights controlled by such third parties. The outcome of any of these proceedings would be uncertain and could have a material adverse effect on the success of our business.

Third parties may initiate legal proceedings against us or our licensors or collaborators alleging that we or our licensors or collaborators infringe the intellectual property rights controlled by these third parties, or we or our licensors or collaborators may initiate legal proceedings against third parties to challenge the validity or scope of intellectual property rights controlled by these third parties, including in oppositions, interferences, reexaminations, *inter partes* reviews, post-grant reviews or derivation proceedings in the United States or comparable proceedings in other jurisdictions. These proceedings can be expensive and time-consuming and many of our or our licensors' or collaborators' adversaries in these proceedings may have the ability to dedicate substantially greater resources to prosecuting these legal actions than we or our licensors or collaborators can.

An unfavorable outcome in any of these proceedings could require us or our licensors or collaborators to cease using the relevant technology or developing or commercializing our product candidates, or to attempt to license any necessary rights to such technology from the prevailing party. Our business could be harmed if the prevailing party does not offer us or our licensors or collaborators a license, or otherwise offers a license on terms that are not commercially reasonable or are otherwise unfavorable to us. Even if we or our licensors or collaborators obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us or our licensors or collaborators. In addition, we could be found liable for monetary damages if we are found to have infringed a patent, including treble damages and attorneys' fees if such infringement was willful. A finding of infringement could prevent us from commercializing our product candidates or force us to cease some of our business operations, which could materially harm our business.

Furthermore, because of intellectual property litigation and certain other legal proceedings require discovery, which may in some cases be substantial, there is a risk that our confidential information could be compromised by disclosure during the course of such proceedings involving third party intellectual property rights. There could also be public announcements of the results of hearings, motions or other interim rulings or developments in the proceedings, and if securities analysts or investors perceive these results to be negative, the price of shares of our common stock may be materially adversely affected.

We may be subject to claims by third parties asserting that we or our employees have misappropriated their intellectual property or claiming ownership of what we regard as our own intellectual property.

Many of our employees, including members of our senior management, were previously employed at universities or at other biotechnology or pharmaceutical companies, including our competitors or potential competitors, and executed proprietary rights, non-disclosure and non-competition agreements in connection with such previous employment. Although we work to ensure that our employees do not use the proprietary information or know-how of others in their work for us, including through written contractual obligations, we may be subject to claims that we or our employees have used or disclosed confidential information or intellectual property, including trade secrets or other proprietary information, of a former employer of any such employee. Litigation may be necessary to defend against these claims.

If we are unable to successfully defend against any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel. Such intellectual property rights could be determined to be owned by a third party, and we could be required to obtain a license from such third party to commercialize our technology or products. Such a license may not be available to us at all, may not be available to us on commercially reasonable terms or may include obligations that are otherwise unfavorable for us. Even if we successfully defend against such claims, litigation could result in substantial costs and distract management from our day-to-day operations.

Our inability to protect our confidential information and trade secrets would harm our business and competitive position.

In addition to seeking patents covering our technology and products, we also rely on trade secrets, including unpatented know-how, technology and other proprietary information, to maintain our competitive position. We seek to protect these trade secrets, in part, by entering into confidentiality agreements with parties who have access to them, including our employees, corporate collaborators, scientific collaborators, contract manufacturers, advisors and other third parties. We also enter into confidentiality and intellectual property, including patent, assignment agreements with our employees and consultants. Despite these efforts, any of these parties, including our current or former employees or consultants and those of our service providers or collaborators, may breach the applicable agreements and disclose our confidential information, including our trade secrets, and we may not be able to obtain adequate remedies for any such breach. Additionally, bringing a claim against a party for illegally disclosing or misappropriating a trade secret is difficult, expensive and time-consuming, the outcome of such a claim is unpredictable and any such litigation involving our trade secrets puts us at significant risk that such trade secrets will be publicly disclosed, thereby significantly reducing or eliminating their value and potentially increasing competition and otherwise harming our business. Further, some courts both within and outside the United States may be less willing or unwilling to protect trade secrets. If a competitor lawfully obtained or independently developed any of our trade secrets, we would have no right to prevent such competitor from using any such trade secret to compete with us, which could harm our competitive position.

Risks Related to Our Financial Position and Capital Needs

We expect to incur net losses for the foreseeable future.

We are a clinical-stage biotechnology company with a limited operating history. Investment in biopharmaceutical product development is highly speculative because it entails substantial upfront capital expenditures and significant risk that any potential product candidate will fail to demonstrate adequate effect with an acceptable safety profile, gain regulatory approval and become commercially viable. We have no products approved for commercial sale, have not generated any revenue from product sales to date and continue to incur significant research and development and other expenses related to our ongoing operations. As a result, we are not profitable and have incurred losses in each period since our inception in 2001, with the exception of the fiscal year ended December 31, 2015, due primarily to the $350.0 million up-front payment we received from BMS under our license and collaboration agreement for cabiralizumab, and the fiscal year ended December 31, 2011, due primarily to an upfront payment we received from a collaboration partner. For the year ended December 31, 2018, we reported a net loss of $140.4 million.

Although we may from time to time report profitable results, we expect to continue to incur significant expenses and increasing operating losses for the foreseeable future. The net losses we incur may fluctuate significantly from quarter to quarter. We expect our operating expenses to increase as we advance our research and development of, and seek regulatory approvals for, our product candidates. We may encounter unforeseen expenses, difficulties, complications, delays and other unknown circumstances 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 revenues. 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 currently have no source of product revenue and may never become consistently profitable.

To date, we have not generated any revenue from commercialization of our product candidates. Our ability to generate product revenue and ultimately become profitable depends upon our ability, alone or with our partners, to successfully commercialize products, including our current product candidates and other product candidates that we may develop, in-license or acquire in the future. We do not anticipate that we will generate revenue from the sale of products for the foreseeable future. Our ability to generate future product revenue from our current or future product candidates also depends on additional factors, including our or our partners' ability to:

- successfully complete research and clinical development of current and future product candidates;
- establish and maintain supply and manufacturing relationships with third parties to ensure adequate, timely and compliant manufacturing of bulk drug substances and drug products to maintain our or our partners' supply of such bulk drug substances and drug products;
- launch and commercialize any product candidates for which we obtain marketing approval, and if we launch independently or with certain partners, successfully establish a sales force and marketing and distribution infrastructure;
- obtain coverage and adequate product reimbursement from third-party payors, including government payors;
- successfully and timely develop, validate and obtain any necessary regulatory approvals for companion diagnostics to any of our approved product candidates;
- achieve market acceptance for any of our or our partners' approved products;
- acquire rights to and otherwise establish, maintain and protect intellectual property rights necessary to develop and commercialize our product candidates; and
- attract, hire and retain qualified personnel.

In addition, because of the numerous risks and uncertainties generally associated with development of pharmaceutical products, including that they may not advance through clinical development or achieve the endpoints of applicable clinical trials, we are unable to predict the timing or amount of expenses associated with development of our product candidates, or if or when we will achieve or maintain profitability. In addition, our expenses could increase beyond our current expectations if we decide to or are required by the FDA or any comparable foreign regulatory authority to perform studies or trials in addition to those that we currently anticipate. Even if we successfully complete the development and regulatory processes described above, we expect that we will incur significant costs in connection with launching and commercializing our products.

Even if we generate revenue from the sale of any of our products that may be approved, we may not become profitable and may need to obtain additional funding to continue operations. If we fail to become profitable or do not sustain profitability on a continuing basis, then we may be unable to continue our operations at planned levels and be forced to reduce our operations.

We will require additional capital to finance our operations, which may not be available to us on acceptable terms or at all. As a result, we may not complete the development and commercialization of our current product candidates or develop new product candidates.

As a research and development company, our operations have consumed substantial amounts of cash since inception. We have sufficient cash and cash equivalents to fund our projected operating expenses and capital expenditure requirements for at least the next 12 months and, as a result of our restructuring and other cost control measures, we expect our expenses to decrease in the short term. However, we expect our research and development expenses will increase substantially in connection with our ongoing activities, particularly as we advance our product candidates further into clinical development, advance additional product candidates into clinical trials and increase the number and size of our clinical trials. In addition, circumstances may cause us to consume capital more rapidly than we currently anticipate. For example, as we move our product candidates through preclinical studies and into clinical development, we may observe adverse results that require us or one of our collaboration partners to terminate the program for a product candidate. Alternatively, we may be required to conduct additional research or development activities or studies for a product candidate or substantially redesign a product candidate, each of which could lengthen the development process and increase our development costs for such product candidate. If we choose to initiate additional clinical trials for certain product candidates, we may need to raise additional funds or otherwise obtain funding through product collaborations beyond the collaborations we currently have in place. In any event, we will require additional capital to obtain regulatory approval for, and to commercialize, our current and future product candidates.

If we need to secure additional financing, fundraising efforts may divert our management from our day-to-day activities, which may adversely affect our ability to develop and commercialize current and future product candidates. In addition, we cannot guarantee that future financing will be available in sufficient amounts or on terms acceptable to us, if at all. If we do not raise additional capital when required or on acceptable terms, we may need to:

- significantly delay, scale back or discontinue the development or commercialization of one or more of our product candidates or cease operations altogether;
- seek collaborations for research and development programs at an earlier stage than we would otherwise desire or on terms less favorable than might otherwise be available; or
- relinquish or license to third parties on unfavorable terms our rights to technologies or product candidates that we otherwise would seek to develop or commercialize ourselves.

If we need to conduct additional fundraising activities and we do not raise additional capital in sufficient amounts or on terms acceptable to us, we may be required to halt or delay our ongoing development efforts and may be prevented from pursuing further development and commercialization efforts, which could have a material adverse effect on our business, operating results and prospects.

The time through which our financial resources will adequately support our operations could vary as a result of numerous factors, including factors discussed elsewhere in this “Risk Factors” section. Our future funding requirements, both short- and long-term, will depend on many factors, including:

- the initiation, progress, timing, costs and results of preclinical and clinical studies for our current product candidates and any future product candidates;
- the outcome, timing and cost of seeking and obtaining regulatory approvals from the FDA and comparable foreign regulatory authorities, including the potential that such authorities may require us to perform more studies than those that we currently expect;
- the cost to establish, maintain, expand and defend the scope of our intellectual property portfolio, including the amount and timing of any payments we may be required to make, or that we may receive, in connection with licensing, preparing, filing, prosecuting, maintaining, defending and enforcing any of our patents or other intellectual property rights;
- the effect of competing technological and market developments;
- market acceptance of any of our product candidates that may receive regulatory approval;

- the costs of acquiring, licensing or investing in additional businesses, products, product candidates and technologies;
- the cost and timing of selecting, auditing and validating a manufacturing site for commercial-scale manufacturing; and
- the cost of establishing sales, marketing and distribution capabilities for any product candidates for which we may receive regulatory approval and that we choose to commercialize ourselves or with our collaboration partners.

If a lack of available capital means that we cannot expand our operations or otherwise capitalize on our business opportunities, our business, financial condition and results of operations could be materially adversely affected.

Raising additional capital may cause dilution to our existing stockholders, restrict our operations or require us to relinquish rights to our technologies.

Until we generate sufficient product revenue, if ever, we expect to finance our future cash needs through public or private equity or debt offerings. Additional capital may not be available on reasonable terms, if at all. Raising additional funds through the issuance of additional debt or equity securities could dilute our existing stockholders or increase fixed payment obligations. Furthermore, these securities may have rights senior to those of our common stock and could contain covenants that restrict our operations and potentially impair our competitiveness, including limitations on our ability to incur additional debt, limitations on our ability to acquire, sell or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business. Any of these events could significantly harm our business, financial condition and prospects.

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

On December 22, 2017, the Tax Act was signed into law. The Tax Act, among other things, contains significant changes to corporate taxation, including (i) reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, (ii) limitation of the tax deduction for interest expense to 30% of adjusted earnings (except for certain small businesses), (iii) limitation of the deduction for net operating losses to 80% of current year taxable income in respect of net operating losses generated during or after 2018 and elimination of net operating loss carrybacks, (iv) one-time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, (v) immediate deductions for certain new investments instead of deductions for depreciation expense over time, and (vi) modifying or repealing many business deductions and credits, including reducing the Orphan Drug Credit from 50% to 25% of clinical costs incurred in the United States. Any federal net operating loss incurred in 2018 and in future years may now be carried forward indefinitely pursuant to the Tax Act. It is uncertain if and to what extent various states will enact legislation to conform to the Tax Act. We continue to examine the impact the Tax Act may have on our business.

Risks Related to the Ownership of Our Common Stock

The market price of our stock is volatile.

The trading price of our common stock has been and is likely to continue to be volatile. Since shares of our common stock were sold in our initial public offering in September 2013, our closing stock price as reported on The Nasdaq Global Market and The Nasdaq Global Select Market has ranged from $8.12 to $60.89 through February 25, 2019. The following factors, in addition to other risk factors described in this "Risk Factors" section and elsewhere in this Annual Report on Form 10-K, may have a significant impact on the market price of our common stock:

- results or status of or plans for clinical trials of our product candidates or those of our competitors, as well as interpretation and perception of such results, status or plans by third parties;
- announcements by us, our partners or our competitors of significant acquisitions, strategic collaborations, joint ventures, collaborations or capital commitments;
- success or failure of products or technologies that compete or may compete with our product candidates and technologies;
- regulatory actions with respect to our product candidates or our competitors' products;
- actual or anticipated changes in our or our partners' growth rates relative to our competitors;
- failure of our partners to effectively execute or changes in our partners' strategies with respect to our product candidates or collaborations;
- regulatory or legal developments in the United States and other countries;
- developments or disputes concerning our patent applications, issued patents or other proprietary rights;
- our dependence on third parties, including CMOs, CROs and collaboration partners, including those we may engage to develop and provide us with companion diagnostic products;
- recruitment or departure of key personnel;
- level of expenses related to any of our product candidates or clinical development programs;
- results of our efforts to in-license or acquire additional product candidates or products;
- actual or anticipated changes in estimates as to our financial results, development timelines or recommendations by securities analysts;
- variations in our financial results or those of companies that are perceived to be comparable to us;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- announcements or expectations of additional financing efforts;
- sales of our common stock by us, our insiders or our other stockholders;
- changes in the structure of healthcare payment systems;
- market conditions in the pharmaceutical and biotechnology sectors; and
- general economic, industry, political and market conditions.

In addition, the stock market in general, and The Nasdaq Global Select Market and biotechnology 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. The realization of any of the above risks or any of a broad range of other risks, including those described in this "Risk Factors" section, could have a dramatic and material adverse impact on the market price of our common stock.

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

The market price of our common stock may be volatile, and in the past, companies that have experienced volatility in the market price of their stock have been subject to securities class action litigation. We may become a target of this type of litigation in the future. Securities litigation against us could result in substantial costs and divert our management's attention from other business concerns, which could seriously harm our business.

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

As of December 31, 2018, our executive officers, directors, holders of 5% or more of our capital stock and their respective affiliates beneficially owned approximately 49% of our common stock. This concentration of share ownership may adversely affect the trading price of our common stock because investors often perceive disadvantages in owning stock in companies with controlling stockholders. As a result, these stockholders, acting together, could significantly influence all matters requiring approval by our stockholders, including the election of directors and the approval of mergers or other business combination transactions. The interests of these stockholders may not always coincide with our interests or the interests of other stockholders.

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

Sales of a substantial number of shares of our common stock in the public market or the perception that these sales might occur could depress the market price of our common stock and could impair our ability to raise capital through the sale of additional equity securities. We are unable to predict the effect that sales may have on the prevailing market price of our common stock.

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

We are subject to the periodic reporting requirements of the Securities and Exchange Act of 1934, as amended, or the Exchange Act. We designed our disclosure controls and procedures to reasonably assure that information we must disclose in reports we file or submit under the Exchange Act is accumulated and communicated to management, and recorded, processed, summarized and reported within the time periods specified in the rules and forms of the SEC. We believe that any disclosure controls and procedures or internal controls and procedures, no matter how well-conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met.

These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by an unauthorized override of the controls. Accordingly, because of the inherent limitations in our control system, misstatements due to error or fraud may occur and not be detected.

Some provisions of our charter documents and Delaware law may have anti-takeover effects that could discourage an acquisition of us by others, even if an acquisition would benefit our stockholders, and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our amended and restated certificate of incorporation and amended and restated bylaws, as well as provisions of Delaware law, could make it more difficult or costly for a third party to acquire us, even if doing so would benefit our stockholders, and could make it more difficult to remove our current management. These provisions include:

- authorizing the issuance of "blank check" preferred stock, the terms of which we may establish and shares of which we may issue without stockholder approval;
- prohibiting cumulative voting in the election of directors, which would otherwise allow for less than a majority of stockholders to elect director candidates;
- prohibiting stockholder action by written consent, thereby requiring all stockholder actions to be taken at a meeting of our stockholders;

- eliminating the ability of stockholders to call a special meeting of stockholders; and
- establishing advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted upon at stockholder meetings.

These provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, who are responsible for appointing the members of our management. Because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the General Corporation Law of the State of Delaware, or the DGCL, which may discourage, delay or prevent someone from acquiring us or merging with us whether or not it is desired by or beneficial to our stockholders. Under the DGCL, a corporation may not, in general, engage in a business combination with any holder of 15% or more of its capital stock unless the holder has held the stock for three years or, among other things, the board of directors has approved the transaction. Any provision of our amended and restated certificate of incorporation or amended and restated bylaws or Delaware law that has the effect of delaying or deterring a change of control could limit the opportunity for our stockholders to receive a premium for their shares of our common stock and could also affect the price that some investors are willing to pay for our common stock.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Our principal executive office is currently located in South San Francisco, California, and consists of 115,466 square feet of office and laboratory space, all of which is located in a single building, under a lease that expires on December 31, 2027. We believe that our existing facility is sufficient for our current needs.

Item 3. Legal Proceedings.

We are not currently subject to any material legal proceedings.

Item 4. Mine Safety Disclosures.

None.

PART II

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

Market Information

Our common stock is traded on The Nasdaq Global Select Market under the symbol "FPRX."

Holders of Record

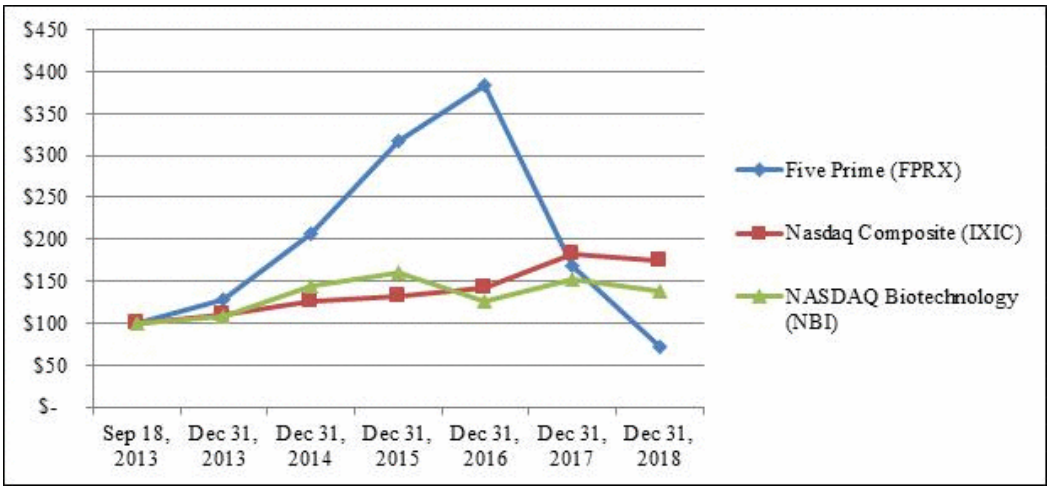
As of February 19, 2019, we had 35,487,149 shares of common stock outstanding held by approximately 29 stockholders of record. The actual number of stockholders is greater than this number of record holders, and includes stockholders who are beneficial owners, but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

Dividend Policy

We have never declared or paid any cash dividends on our capital stock and do not anticipate paying any cash dividends in the foreseeable future. Payment of cash dividends, if any, in the future will be at the discretion of our board of directors and will depend on then-existing conditions, including our financial condition, operating results, contractual restrictions, capital requirements, business prospects and other factors our board of directors may deem relevant.

Stock Performance Graph

The following graph illustrates a comparison of the total cumulative stockholder return on our common stock since our initial public offering on September 18, 2013 with the Nasdaq Composite Index and the Nasdaq Biotechnology Index. The stockholder return shown in the graph below is not necessarily indicative of future performance, and we do not make or endorse any predictions as to future stockholder returns. This graph shall not be deemed "soliciting material" or be deemed "filed" for purposes of Section 18 of the Exchange Act, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any of our filings under the Securities Act, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.



$100 investment in stock or index	Sep 18, 2013	Dec 31, 2013	Dec 31, 2014	Dec 31, 2015	Dec 31, 2016	Dec 31, 2017	Dec 31, 2018
Five Prime (FPRX)	$ 100.00	$ 128.36	$ 206.42	$ 317.28	$ 383.10	$ 167.58	$ 71.10
Nasdaq Composite Index (IXIC)	$ 100.00	$ 110.39	$ 125.17	$ 132.34	$ 142.27	$ 182.45	$ 175.37
Nasdaq Biotechnology (NBI)	$ 100.00	$ 107.41	$ 144.04	$ 160.49	$ 125.69	$ 152.16	$ 137.97

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

None.

Item 6. Selected Financial Data.

You should read the following selected financial data together with the "Management's Discussion and Analysis of Financial Condition and Results of Operations" section of this report and our financial statements and the accompanying notes included elsewhere in this report. We have derived the statements of operations data for the years ended December 31, 2018, 2017 and 2016 and the balance sheet data as of December 31, 2018 and 2017 from our audited financial statements appearing in this report. We have derived the statements of operations data for the years ended December 31, 2015 and 2014 and the balance sheet data as of December 31, 2016, 2015, and 2014 from our audited financial statements not included in this report. Our historical results for any prior period are not necessarily indicative of results to be expected in any future period.

	Year Ended December 31,				
(in thousands, except per share amounts)	**2018**	**2017**	**2016**	**2015**	**2014**
Statement of Operations Data:					
Collaboration and license revenue [1]	$ 49,868	$ 39,508	$ 30,691	$ 379,801	$ 19,231
Operating expenses:					
Research and development	156,352	150,908	94,072	70,197	43,173
General and administrative	39,671	40,002	35,831	22,631	13,632
Total operating expenses	196,023	190,910	129,903	92,828	56,805
(Loss) income from operations	(146,155)	(151,402)	(99,212)	286,973	(37,574)
Interest income	5,792	2,978	2,467	487	210
Other loss, net	(84)	(94)	—	(3)	(60)
(Loss) income before income tax	(140,447)	(148,518)	(96,745)	287,457	(37,424)
Income tax (provision) benefit	—	(1,704)	31,048	(37,810)	—
Net (loss) income	$ (140,447)	$ (150,222)	$ (65,697)	$ 249,647	$ (37,424)
Basic net (loss) income per share attributable to common stockholders [2]	$ (4.13)	$ (5.38)	$ (2.44)	$ 9.73	$ (1.79)
Diluted net (loss) income per share attributable to common stockholders [2]	$ (4.13)	$ (5.38)	$ (2.44)	$ 9.23	$ (1.79)
Weighted average shares of common stock outstanding used in computing basic net (loss) income per share [2]	33,976	27,945	26,955	25,661	20,865
Weighted average shares of common stock outstanding used in computing diluted net (loss) income per share [2]	33,976	27,945	26,955	27,035	20,865

(1) Effective January 1, 2018, we adopted Financial Accounting Standards Board, or FASB, Accounting Standard Update, or ASU 2014-09*, Revenue from Contracts with Customers (Topic 606)*, or Topic 606, using the modified retrospective transition method. We applied the standard to contracts that were not completed at the date of initial application. See Note 2 to our financial statements for impact of our adoption of Topic 606 on the financial statement line items.

(2) See Note 7 to our financial statements for an explanation of the method used to calculate basic and diluted net income (loss) per share of common stock and the weighted average number of shares used in computation of the per share amounts.

	As of December 31,				
(in thousands)	**2018**	**2017**	**2016**	**2015**	**2014**
Balance Sheet Data:					
Cash, cash equivalents and marketable securities	$ 270,138	$ 292,690	$ 421,748	$ 517,466	$ 149,054
Working capital	261,081	260,209	401,384	448,913	131,443
Total assets	321,534	344,047	448,281	548,285	155,631
Total stockholders' equity	265,139	265,202	391,575	433,206	85,205

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

You should read the following discussion of our financial condition and results of operations in conjunction with the financial statements and the related notes included elsewhere in this Annual Report on Form 10-K. The following discussion contains forward-looking statements that reflect our plans, estimates and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this Annual Report on Form 10-K, particularly in "Special Note Regarding Forward-Looking Statements and Industry Data" and "Risk Factors."

Overview

We are a clinical-stage biotechnology company focused on discovering and developing innovative protein therapeutics to improve the lives of patients with serious diseases. Each of our product candidates has an innovative mechanism of action and addresses patient populations for which better therapies are needed. Our primary focus is on researching and developing immuno-oncology and targeted cancer therapies. In addition, we use companion diagnostics where appropriate to allow us to select patients most likely to benefit from treatment with our product candidates. The most advanced product candidates we or our partners are developing are identified below.

- **Bemarituzumab (FPA144)** is an antibody that inhibits fibroblast growth factor receptor 2b, or FGFR2b, that we are studying in a clinical trial in combination with 5-fluorouracil (5-FU), leucovorin and oxaliplatin, a standard-of-care chemotherapy regimen known as mFOLFOX6, as front-line treatment of patients with gastric (stomach) or gastroesophageal junction, or GEJ, cancer that overexpresses FGFR2b. In December 2017, we granted Zai Lab (Shanghai) Co., Ltd., or Zai Lab, an exclusive license to develop and commercialize bemarituzumab in China, Hong Kong, Macau and Taiwan.
- **FPA150** is a CD8 T-cell checkpoint inhibitor antibody that targets B7-H4 that we are studying in a clinical trial in multiple cancers.
- **FPT155** is a soluble CD80 fusion protein that enhances co-stimulation of T-cells through CD28 that we are studying in a clinical trial in multiple cancers.
- **Cabiralizumab (FPA008)** is an antibody that inhibits colony stimulating factor-1, or CSF1, receptor, or CSF1R, that we and our partner Bristol-Myers Squibb Company, or BMS, are studying in clinical trials in multiple cancers in combination with BMS's PD-1 immune checkpoint inhibitor, *Opdivo*® (nivolumab). In October 2015, we granted BMS an exclusive worldwide license for the development and commercialization of cabiralizumab.
- **BMS-986258** is an anti-T-cell immunoglobulin and mucin domain-3, or TIM-3, antibody that our partner, BMS, is studying in a clinical trial as a single agent and in combination with *Opdivo* in patients with advanced malignant tumors.

We are focusing our activities on immuno-oncology and targeted cancer therapies, which we believe to have significant therapeutic potential. We leverage our differentiated discovery capabilities and protein therapeutic generation and engineering capabilities to identify and validate targets that we believe could be useful in oncology and generate and preclinically test therapeutic proteins, including antibodies and fusion proteins, directed to or containing the targets we identify and validate. We plan to continue to advance selected therapeutic candidates into clinical development. Our product candidates are typically only-in-class, first-in-class or meaningfully differentiated from other in-class therapeutics. We generally look for single-agent activity or clear activity in, for example, tumor types that are rarely sensitive to checkpoint inhibitors.

We have no products approved for commercial sale and have not generated any revenue from product sales to date. We continue to incur significant research and development and other expenses related to our ongoing operations and we expect that our expenses will increase as we advance our product candidates into later stages of clinical development and increase the number of product candidates in clinical development. We have incurred losses in each period since our inception in 2002, with the exception of the fiscal year ended December 31, 2015, due primarily to the $350.0 million upfront payment we received from BMS from our license and collaboration agreement for cabiralizumab, and the fiscal year ended December 31, 2011, due primarily to the $50.0 million upfront payment we received from GSK from our license and collaboration agreement for FP-1039. For the years ended December 31, 2018 and 2017, we reported net loss of $140.4 million and net loss of $150.2 million, respectively.

Critical Accounting Policies and Estimates

We based our management's discussion and analysis of financial condition and results of operations upon our condensed financial statements, which we prepared in accordance with U.S. generally accepted accounting principles, or GAAP. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses. We evaluate our critical accounting policies and estimates on an ongoing basis. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, and these estimates form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results under different assumptions and conditions may differ from these estimates. Our significant accounting policies are more fully described in Note 2 to our financial statements.

We define our critical accounting policies as those accounting principles generally accepted in the United States of America that require us to make subjective estimates and judgments about matters that are uncertain and are likely to have a material impact on our financial condition and results of operations as well as the specific manner in which we apply those principles. We believe the critical accounting policies used in the preparation of our financial statements that require significant estimates and judgments are as follows:

Revenue Recognition

The terms of our collaborative research and development agreements include upfront and license fees, research, development and other funding or reimbursements, milestone and other contingent payments for the achievement of defined collaboration objectives and certain preclinical, clinical, regulatory and sales-based events, as well as royalties on sales of commercialized products. Arrangements that include upfront payments may require deferral of revenue recognition to a future period until we perform obligations under these arrangements. We record research and development funding payable to us as accounts receivable when our right to consideration is unconditional. The event-based milestone and other contingent payments represent variable consideration, and we use the most likely amount method to estimate this variable consideration. Given the high degree of uncertainty around occurrence of these events, we determine the milestone and other contingent amounts to be fully constrained until the uncertainty associated with these payments is resolved. We will recognize revenue from sales-based royalty payments when or as the sales occur. We will re-evaluate the transaction price in each reporting period as uncertain events are resolved and other changes in circumstances occur.

A performance obligation is a promise in a contract to transfer a distinct good or service and is the unit of accounting in Topic 606. A contract's transaction price is allocated among each distinct performance obligation based on relative standalone selling price and recognized as revenue when, or as, the applicable performance obligation is satisfied. Under Topic 606, we elected to use the practical expedient permitted related to adoption, which does not require us to disclose certain information regarding our remaining performance obligations as of the end of the reporting period prior to the initial date of adoption. Additionally, we elected the practical expedient for certain research and development funding which allows us to recognize revenue in the amount for which we have a right to invoice if our right to consideration is an amount that corresponds directly to the value of our performance completed to date. As a result, we effectively bypass the steps of determining the transaction price and allocating that transaction price to the performance obligation.

See Note 2 to our financial statements for information regarding our adoption of Topic 606.

Research and Development Expenses

Research and development expenses consist of costs we incur for our own and for sponsored and collaborative research and development activities. Research and development costs are expensed as incurred. Research and development costs consist of salaries and benefits, including associated stock-based compensation, laboratory supplies and facility costs, as well as fees paid to other entities that conduct certain research and development activities on our behalf. We estimate preclinical study and clinical trial expenses based on the services performed pursuant to contracts with research institutions and contract research organizations, or CROs, and clinical manufacturing organizations, or CMOs, that conduct and manage preclinical studies and clinical trials on our behalf based on actual time and expenses incurred by them. Further, we accrue expenses related to clinical trials based on the level of patient enrollment and activity according to the related agreement. We monitor patient enrollment levels and related activity to the extent reasonably possible and adjust estimates accordingly. If we do not identify costs that we have begun to incur or if we underestimate or overestimate the level of services performed or the costs of these services, our actual expenses could differ from our estimates.

We expense payments for the acquisition and development of technology as research and development costs if, at the time of payment, the technology is under development, is not approved by the U.S. Food and Drug Administration or other regulatory agencies for marketing, has not reached technical feasibility, or otherwise has no foreseeable alternative future use.

Stock-Based Compensation

We issue stock-based compensation awards in the form of restricted stock awards and stock options. We measure stock-based compensation expense related to these awards based on the fair value of the award on the date of grant and recognize stock-based compensation expense on a straight-line basis over the requisite service period of the awards, which generally equals the vesting period.

Restricted stock awards we grant generally vest over three years, though we have granted awards with shorter vesting schedules from time to time. We base stock-based compensation expense related to restricted stock awards on the closing market value of our common stock at the date of grant and recognize expense ratably over the requisite service period.

Stock options we grant generally vest over four years. We have selected the Black-Scholes option pricing model to determine the fair value of stock option awards, which requires the input of various assumptions that require management to apply judgment and make assumptions and estimates, including:

- The expected term of the stock option award, which we calculate using the simplified method, due to limited history, in accordance with the Securities and Exchange Commission Staff Accounting Bulletin Nos. 107 and 110, which calculates the expected term as the midpoint of the contractual term of the options and the ordinary vesting period;
- The expected volatility of the underlying common stock, which we estimate for options based on the historical volatility of our common stock price since we became publicly traded;
- The assumed dividend yield, which is based on our expectation of not paying dividends for the foreseeable future; and
- The fair value of our common stock is determined on the date of grant, as described below.

We estimated the fair value of each stock option using the Black-Scholes option-pricing model based on the date of grant of such stock option with the following assumptions:

	Year Ended December 31,		
	2018	2017	2016
Expected term (years)	5.5-6.3	5.5-6.3	5.5-6.3
Expected volatility	68-70%	66-70%	69-74%
Risk-free interest rate	2.6-2.9%	1.9-2.2%	1.3%-1.8%
Expected dividend yield	0.0%	0.0%	0.0%

Income Taxes

We account for income taxes using the liability method, under which deferred tax assets and liabilities are determined based on differences between financial reporting and tax basis of assets and liabilities and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. On December 22, 2017, the Tax Cuts and Jobs Act of 2017, or the Tax Act, was signed into law. The Tax Act reduces the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%. Although the Tax Act is generally effective on January 1, 2018, GAAP requires recognition of the tax effects of new legislation during the reporting period that includes the enactment date, which was December 22, 2017. Because of the impacts of the Tax Act, the SEC issued Staff Accounting Bulletin No. 118 Income Tax Accounting Implications of the Tax Cuts and Jobs Act (SAB 118) that allows us to record provisional amounts for those impacts, with the requirement that the accounting be completed in a period not to exceed one year from the date of enactment. As a result, as of December 31, 2017, we performed a provisional estimate of the effect of the Tax Act in the financial statements. In the fourth quarter of 2018, we completed our analysis to determine the effect of the Tax Act. No material adjustments were noted from the completion of the analysis as of December 31, 2018. The primary impact of the Tax Act resulted from the re-measurement of deferred tax assets and liabilities due to the change in the corporate tax rate, reducing our deferred tax assets by $27.1 million with a corresponding reduction in our valuation allowance, which had no effect on our effective tax rate.

Our income tax provision for 2017 is based on the Internal Revenue Service reducing our tentative net operating loss carryback refund claim filed in March 2017. Our income tax benefit for 2016 relates to our ability to carry back 2016 losses to the 2015 tax year and to obtain a refund of taxes paid related to a prior period. Valuation allowances are provided when the expected realization of the deferred tax assets does not meet the more-likely-than-not criteria. As a result, deferred tax assets at the end of 2018 are subject to a full valuation allowance. We are required to determine whether it is more likely than not that a tax position will be sustained upon examination by the appropriate taxing authorities before any part of the benefit can be recorded in the financial statements. It is our practice to recognize interest and penalties related to unrecognized tax benefits, if any, as a component of income tax expense.

New Accounting Standards

For a discussion of new accounting standards, please read Note 2 to our financial statements.

Financial Overview

Collaboration and License Revenue

We have not generated any revenue from product sales. We have derived our revenue to date from upfront payments, research and development funding and milestone payments under collaboration and license agreements with our collaboration partners and licensees. We currently have an active cabiralizumab license and collaboration agreement with BMS and an active collaboration and license agreement with Zai Lab for bemarituzumab. We are winding down the research activities in our immuno-oncology research collaboration with BMS as the research term ends in March 2019 and we completed the research terms of our research collaboration in respiratory diseases with GSK and of our fibrosis and CNS research collaboration with UCB Pharma S.A., or UCB, in July 2016 and March 2016, respectively. For additional information on these collaborations, please see the section titled "Business – Collaborations" located elsewhere in this report.

Summary Revenue by Collaboration and License Agreements

The following is a comparison of collaboration and license revenue for the years ended December 31, 2018, 2017 and 2016:

	Year Ended December 31,		
(in millions)	**2018**	**2017**	**2016**
Milestone Payments			
Cabiralizumab Collaboration - BMS	25.0	—	—
Immuno-oncology Research Collaboration - BMS	—	5.0	—
Fibrosis and CNS Collaboration - UCB	0.3	0.3	0.4
Respiratory Diseases Collaboration - GSK	—	0.5	1.8
Other Payments			
China Collaboration - Zai Lab	5.1	—	—
Cabiralizumab Collaboration - BMS	13.4	23.7	14.4
Immuno-oncology Research Collaboration - BMS	6.1	7.0	7.7
Fibrosis and CNS Collaboration - UCB	—	3.0	3.1
Respiratory Diseases Collaboration - GSK	—	—	3.2
Other License Revenue	—	—	0.1
Total	$ 49.9	$ 39.5	$ 30.7

We expect that the level of revenue we generate will fluctuate from period to period as a result of the timing and amount of milestone, reimbursable expense and other payments we receive in the course of our existing collaborations and licenses and as a result of the deferred revenue that we recognize, including due to revisions to estimates related to reimbursable activities or to estimates of actual or estimated costs as a percentage of total budgeted costs, or as a result of entry into any new collaborations and license agreements.

BMS Immuno-Oncology Research Collaboration

In March 2014, we entered into a research collaboration and license agreement, or the Immuno-Oncology Research Collaboration, with BMS, to carry out a research program to (i) discover novel interacting proteins in two undisclosed immune checkpoint pathways, which we refer to as the checkpoint pathways, using our target discovery platform; (ii) further the understanding of target biology with respect to targets in these checkpoint pathways; and (iii) discover and pre-clinically develop compounds suitable for development for human therapeutic uses against targets in these checkpoint pathways. Under the Immuno-Oncology Research Collaboration, we granted BMS an exclusive, worldwide license to research, develop and commercialize products directed towards certain targets in the checkpoint pathways. BMS has an option to take exclusive licenses to additional targets we may identify in these checkpoint pathways pursuant to the research plan under the immuno-oncology research collaboration. Based on data arising from our activities under the research plan, in January 2016, we amended the Immuno-Oncology Research Collaboration to add an additional checkpoint pathway to the research program, for a total of three immune checkpoint pathways.

We received an upfront payment of $20.0 million from BMS in April 2014 in connection with our entry into the Immuno-Oncology Research Collaboration. BMS was obligated to pay us $9.5 million in research funding over the course of the three-year research term based on the research activities currently planned under the research plan. BMS had the option to extend the research term for two additional one-year periods on a year-by-year basis for an additional $2.1 million for each extension, during which extensions we would be obligated to perform additional services as agreed to with BMS and BMS would be obligated to pay us research funding with respect to such services. The initial research term under the Immuno-Oncology Research Collaboration expired in March 2017. In each of December 2016 and December 2017, BMS exercised its option to extend the research term for an additional year to March 2018 and March 2019, respectively. In connection with the Immuno-Oncology Research Collaboration, BMS purchased 994,352 shares of our common stock at a price per share of $21.16, for an aggregate purchase price of $21.0 million. We determined that the purchase price of $21.16 per share exceeded the fair value of our common stock by $2.4 million and, therefore, recorded the $2.4 million as deferred revenue that we are recognizing in the same manner as the $20.0 million upfront payment and research funding. We are eligible to receive certain contingent payments with respect to each target subject to the Immuno-Oncology Research Collaboration and royalties on sales of products related to such targets, if any. In December 2017, we recognized $5.0 million related to a developmental contingent payment.

The Immuno-Oncology Research Collaboration will terminate upon the expiration of all payment obligations under the collaboration. In addition, BMS may terminate the Immuno-Oncology Research Collaboration in its entirety or on a collaboration target-by-collaboration target basis at any time with advance written notice and either party may terminate the collaboration in its entirety or on a collaboration target-by-collaboration target basis with written notice for the other party's material breach if such other party fails to timely cure the breach or immediately upon certain insolvency events.

We identified one performance obligation under the Immuno-Oncology Research Collaboration for the research license to access our technology, the exclusive commercial license and research activities. BMS's options to select additional collaboration targets are not priced at a discount and therefore do not represent performance obligations for which the transaction price would be allocated. The transaction price of $36.1 million includes the $20.0 million non-refundable upfront fee, $13.7 million of research funding and $2.4 million of equity premium. We concluded that the transaction price should not include the variable consideration related to maintenance fees and unachieved clinical and regulatory development milestones as this consideration was considered to be constrained as it is probable that the inclusion of such variable consideration could result in a significant reversal in revenue in the future. We will recognize any consideration related to sales-based payments (including milestones and royalties) when the related sales occur, as we have determined that these amounts relate predominantly to the license granted and therefore will be recognized on the later to occur of satisfaction of the performance obligation, or the occurrence of the related sales. We will re-evaluate the transaction price at each reporting period. For year ended December 31, 2018, no adjustments were made to the transaction price.

Upon adoption of Topic 606, we recognized an additional $0.7 million of revenue, through a decrease to deferred revenue and an increase to beginning retained earnings, based on the difference between the input method currently used under Topic 606 and the ratable recognition method previously used under Topic 605. Under the input method, we recognize revenue on the basis of our efforts or inputs applicable to the satisfaction of a performance obligation (e.g., resources consumed, labor hours expended, costs incurred, or time elapsed) relative to the total expected inputs applicable to the satisfaction of that performance obligation. We concluded that we will recognize revenue based on actual costs incurred as a percentage of total budgeted costs as we complete our performance obligation. Revenue recognized from the performance obligation was $6.1 million for the year ended December 31, 2018. Through December 31, 2018, we have recognized $34.6 million of the transaction price as collaboration revenue under the agreement. We will recognize the remaining transaction price of $1.5 million as revenue under the input method over the estimated performance period.

For the years ended December 31, 2018, 2017, and 2016, we recognized $6.1 million, $12.0 million and $7.7 million, respectively, of revenue under the Immuno-Oncology Research Collaboration. As of December 31, 2018 and 2017, we had deferred revenue relating to the immuno-oncology research collaboration of $1.5 million and $6.3 million, respectively.

BMS License and Collaboration Agreement

On October 14, 2015, we entered into a license and collaboration agreement, or the Cabiralizumab Collaboration Agreement, pursuant to which we granted BMS exclusive global rights to develop and commercialize certain colony stimulating factor-1 receptor, or CSF1R, antibodies, including our monoclonal CSF1R inhibiting antibody that we refer to as cabiralizumab, and all modifications, derivatives, fragments, or variants of such antibodies, each of which we refer to as a licensed antibody. Under the terms of the Cabiralizumab Collaboration Agreement, BMS is responsible, at its expense, for developing products containing licensed antibodies, each of which we refer to as a licensed product, under a development plan, subject to our option, at our own expense, to conduct certain studies, including registration-enabling studies to support approval of cabiralizumab. BMS is responsible for manufacturing and commercializing each licensed product and we will retain rights to a U.S. co-promotion option. The Cabiralizumab Collaboration Agreement supersedes the clinical trial collaboration agreement we entered into with BMS in November 2014, or the Original Collaboration Agreement. We assessed the two agreements separately as standalone agreements under Topic 606.

We received an upfront payment of $30.0 million from BMS in December 2014 in connection with our entry into the Original Collaboration Agreement. We are completing our Phase 1a/1b clinical trial to evaluate the safety, tolerability and preliminary efficacy of combining *Opdivo*, BMS's programmed-death 1 (PD-1) immune checkpoint inhibitor, with cabiralizumab in multiple tumor types, which we commenced under the Original Collaboration Agreement. BMS bears all costs and expenses relating to this trial, including manufacturing costs for the supply of cabiralizumab, except that we are responsible for our own internal costs, including internal personnel costs.

Under the Original Collaboration Agreement, we identified one performance obligation for the execution of a Phase 1a/1b clinical trial of cabiralizumab in combination with *Opdivo*. The transaction price consists of the $30.0 million non-refundable upfront fee under the Original Collaboration Agreement.

We used the input method to measure progress toward completion of the performance obligation and concluded that we will recognize revenue based on actual costs incurred by our CRO, as a percentage of total budgeted costs as we complete our performance obligation. We will recognize revenue from reimbursements when we have the right to invoice BMS. No adjustment was necessary upon adoption of Topic 606. We recognized $6.6 million of the transaction price as revenue for the year ended December 31, 2018. Total revenue recognized for reimbursements for the year ended December 31, 2018, was $6.9 million. Through December 31, 2018, we recognized $24.8 million of the transaction price as collaboration revenue under the Original Collaboration Agreement. The remaining transaction price of $5.2 million is recorded in deferred revenue as of December 31, 2018 and will be recognized as revenue under the input method over the estimated performance period.

Under the Cabiralizumab Collaboration Agreement, we identified the following performance obligations: (1) license grant to BMS and (2) transfer of licensed know-how to BMS. The transaction price consists of the $350.0 million non-refundable up-front fee. We concluded that the transaction price should not yet include milestone payments that may become due as they are fully constrained. We will recognize any consideration related to royalties when the related sales occur, as we have determined that these amounts relate predominantly to the license granted and therefore will be recognized upon the occurrence of the related sales. We will re-evaluate the transaction price in each reporting period as uncertain events are resolved and other changes in circumstances occur. For the year ended December 31, 2018, no adjustments were made to the transaction price.

The $350.0 million non-refundable upfront fee was fully recognized concurrent with the transfer of the license and know-how in 2015. As such, no adjustment to revenue was necessary under Topic 606. In January 2018, we recognized $25.0 million related to a milestone achieved for the dosing of the first patient in BMS's randomized Phase 2 clinical trial of cabiralizumab in combination with *Opdivo*, with and without chemotherapy, as a treatment for patients with second-line pancreatic cancer.

For the years ended December 31, 2018, 2017, and 2016, we recognized $38.4 million, $23.7 million and $14.4 million, respectively, of revenue under the license and collaboration agreements. As of December 31, 2018 and 2017, we had deferred revenue relating to the license and collaboration agreements of $5.2 million and $11.8 million, respectively.

Zai Lab China License and Collaboration Agreement

In December 2017, we entered into a license and collaboration agreement, or the China Collaboration Agreement, with Zai Lab, pursuant to which we granted Zai Lab an exclusive license to develop and commercialize bemarituzumab in China, Hong Kong, Macau and Taiwan.

Under the terms of the China Collaboration Agreement, Zai Lab will be responsible, at its expense, for (i) developing and commercializing products containing the licensed antibody, each, a licensed product, under a territory development plan and (ii) performing certain development activities to support our global development and registration of licensed products, including our Phase FIGHT trial, in the territory, under a global development plan. Under the terms of the China Collaboration Agreement, Zai Lab paid us a $5.0 million non-refundable and non-creditable upfront fee ($4.2 million after netting of value-added tax withholdings of $0.8 million) in January 2018. Pursuant to the China Collaboration Agreement, with respect to each licensed product, we are eligible to receive up to $39.0 million of specified developmental and regulatory milestone payments. Zai Lab will also be obligated to pay us a royalty, on a licensed product-by-licensed product and region-by-region basis. In addition, Zai Lab agreed to reimburse us for certain global development activities, which is limited to a maximum of $10.0 million, and certain costs for the development of companion diagnostics.

We identified the following performance obligations: (1) license grant to Zai Lab together with the transfer of licensed know-how, development drug supply and global development activities, or the License Grant and (2) development of companion diagnostics. Zai Lab has the option to purchase commercial drug supply from us pursuant to a separate commercial supply agreement to be negotiated in the future. The commercial drug supply will be accounted for as a separate contract when Zai Lab exercises this option. In our evaluation of the transaction price upon the adoption of Topic 606, the $4.2 million non-refundable upfront fee and $8.3 million of expected reimbursement from Zai Lab for global development activities were included as part of the transaction price of $12.5 million. We estimated the $8.3 million of expected reimbursements from Zai Lab based on the probability-weighted amounts of a range of possible consideration amounts. In September 2018, we recorded a $1.7 million receivable related to Zai Lab's $2.0 million clinical development milestone payment, net of value-added tax and other withholdings of $0.3 million, which became due upon dosing of the first patient in the Phase 3 FIGHT trial. We have since re-evaluated the transaction price and increased the transaction price by $2.2 million to $14.7 million which includes the $4.2 million non-refundable upfront fee, $8.8 million of expected reimbursement from Zai Lab for global development activities and the $1.7 million clinical development milestone payment. We have not included the remaining regulatory milestone payments in the transaction price as all such milestone amounts are fully constrained. We will recognize any consideration related to royalties when the related sales occur, as we determined that these amounts relate predominantly to the license granted and therefore will be recognized upon the occurrence of the related sales. We concluded that the reimbursement of costs incurred for the development of companion diagnostics qualifies for the practical expedient under Topic 606, which allows us to recognize revenue in the amount for which we have a right to invoice if our right to consideration is an amount that corresponds directly to the value to Zai Lab of our performance completed to date. We therefore effectively bypass the steps of determining the transaction price and allocating that transaction price to the performance obligation. We will re-evaluate the transaction price in each reporting period as uncertain events are resolved and other changes in circumstances occur.

We use the input method to measure progress toward completion of the performance obligation for the License Grant. We concluded that revenue will be recognized based on actual costs incurred by our CRO as a percentage of total budgeted costs as we complete our performance obligation. We will recognize revenue from reimbursements for the development of companion diagnostics when we have the right to invoice Zai Lab.

No adjustment was necessary upon adoption of Topic 606. For the year ended December 31, 2018, revenue recognized for the License Grant was $1.7 million. Total revenue recognized for the companion diagnostics development performance obligation was $3.3 million. Of the remaining transaction price of $12.9 million, we recorded $5.2 million in deferred revenue, which we will recognize over the estimated performance period for satisfaction of the performance obligations. The remaining $8.7 million of the transaction price will be recorded in deferred revenue when invoiced as we complete global development activities.

GSK Respiratory Diseases and Muscle Diseases Collaborations

In April 2012, we entered into a research collaboration and license agreement, or the Respiratory Diseases Collaboration, with Glaxo Group Limited, or GSK, to identify new therapeutic approaches to treat refractory asthma and chronic obstructive pulmonary disease, or COPD, with a particular focus on identifying novel protein therapeutics and antibody targets. In January 2016, we amended our Respiratory Diseases Collaboration to extend the research term by three months to July 2016 to allow additional validation of the protein targets we discovered and to increase the research funding. In July 2010, we entered into a research collaboration and license agreement, or the Muscle Diseases Collaboration, with GlaxoSmithKline LLC, to identify potential drug targets and drug candidates to treat skeletal muscle diseases. We conducted three customized cell-based screens and one *in vivo* screen of our protein libraries under the muscle diseases collaboration. The research term under the Muscle Diseases Collaboration ended in May 2014 and the agreement terminated in April 2018.

Based on our assessment of the Respiratory Diseases Collaboration and the Muscle Disease Collaboration under Topic 606, we identified one performance obligation under each collaboration for the research license and research activities. The non-refundable upfront fees, the equity premiums and the variable consideration for research activities are included as part of the transaction prices for each collaboration. The clinical and regulatory development milestone payments have not been included in the transaction prices, as all such milestone amounts are fully constrained. We will recognize any consideration related to sales-based payments (including milestones and royalties) when the related sales occur, as we have determined that these amounts relate predominantly to the license granted and therefore will be recognized on the later to occur of satisfaction of the performance obligation, or the occurrence of the related sales. Under the Respiratory Diseases Collaboration, additional research funding that GSK had the option to add was also not included in the transaction price. As the Muscle Diseases Collaboration with GlaxoSmithKline LLC terminated in April 2018, we are no longer eligible to receive milestone payments or royalties under that collaboration. We will re-evaluate the transaction price for the Respiratory Diseases Collaboration in each reporting period as uncertain events are resolved and other changes in circumstances occur. For year ended December 31, 2018, no adjustments were made to the transaction prices of the collaborations with GSK or GlaxoSmithKline LLC.

Under the Respiratory Diseases Collaboration and the Muscle Diseases Collaboration, the non-refundable upfront fees, the equity premiums and the payment for research activities were fully recognized in 2016 and 2014, respectively. As the performance obligations were fully satisfied in prior years, no adjustment to revenue was necessary under Topic 606.

For the years ended December 31, 2018, 2017 and 2016, we recognized $0, $0.5 million and $1.8 million of milestone revenue, respectively, and $0, $0 and $3.2 million of revenue for progress made toward the performance obligation, respectively, under the Respiratory Diseases Collaboration.

UCB Fibrosis and CNS Collaboration

In March 2013, we entered into a research collaboration and license agreement, or the Fibrosis and CNS Collaboration, with UCB Pharma, S.A., or UCB, to identify potential biologics targets and therapeutics in the areas of fibrosis-related immunologic diseases and central nervous system, or CNS, disorders.

Under the terms of the Fibrosis and CNS Collaboration, UCB paid us an upfront payment of $6.0 million in March 2013. In addition, UCB agreed to pay us $6.6 million for a technology fee and $2.0 million for research funding. As of December 31, 2015, we fully collected the technology fees and research funding under the Fibrosis and CNS Collaboration. We are eligible to receive certain evaluation and selection fees and contingent payments with respect to each protein target that UCB elects to obtain an exclusive license, and royalties on the sales of products related to such targets, if any. Our initial research activities under this agreement were completed in March 2016. Upon the completion of those research activities, UCB had up to a two-year evaluation period, which ended in March 2018, during which we were obligated to perform additional services at the request of UCB.

The agreement will terminate upon the expiration of the royalty terms of any products that incorporate or target a protein exclusively licensed under the collaboration. In addition, UCB may terminate this agreement at any time with advance written notice, and either party may terminate the agreement with written notice for the other party's material breach if such other party fails to timely cure the breach or upon certain insolvency events.

Based on our assessment of the Fibrosis and CNS Collaboration under Topic 606, we identified research activities as our only performance obligation. UCB's options to select additional collaboration targets and to license exclusive rights to selected targets are not priced at a discount and therefore do not represent performance obligations for which the transaction price would be allocated. The transaction price of $15.6 million includes the $6.0 million non-refundable upfront fee, the $6.6 million technology access fee, the $1.0 million reimbursement for reagent costs and the $2.0 million of research funding. We have not included the clinical and regulatory development milestone payments in the transaction price as all such milestone amounts are fully constrained. We will recognize any consideration related to sales-based payments (including milestones and royalties) when the related sales occur, as we have determined that these amounts relate predominantly to the license granted and therefore will be recognized on the later to occur of satisfaction of the performance obligation, or the occurrence of the related sales. We will re-evaluate the transaction price in each reporting period as uncertain events are resolved and other changes in circumstances occur. For the year ended December 31, 2018, there was no change in the transaction price.

Upon adoption of Topic 606, we recognized an additional $0.6 million of revenue through a decrease to deferred revenue and an increase to beginning retained earnings, based on the difference between the input method currently used under Topic 606 and the ratable recognition method previously used under Topic 605. We use the input method to measure progress toward completion of the performance obligation and concluded that revenue will be recognized based on actual full-time equivalent labor hours expended as a percentage of total budgeted costs. The $0.6 million adjustment recorded upon the adoption of Topic 606 recognized the remainder of the transaction price.

During 2018, 2017 and 2016, we recognized $0.3 million, $0.3 million and $0.4 million in target evaluation and selection fees, respectively. For the years ended December 31, 2018, 2017 and 2016, revenue recognized for the performance obligation was $0, $3.0 million and $3.1 million, respectively. As of December 31, 2017, we had deferred revenue of $0.6 million which was fully recognized upon adoption of Topic 606.

Research and Development

Research and development expenses consist of costs we incur in performing internal and collaborative research and development activities. Expenses incurred related to collaborative research and development agreements generally approximate the revenue recognized under these agreements. Research and development costs consist of salaries and benefits, including associated stock-based compensation, lab supplies and facility costs, as well as fees paid to other entities that conduct certain research and development activities, including manufacturing, on our behalf.

We are conducting research and development activities on several disease targets and product candidates.

We have a research and development team that designs, manages and evaluates the results of all our research and development activities. We conduct most of our core target discovery and early research and preclinical activities internally and rely more heavily on third parties, such as CROs and CMOs, for the execution of our IND-enabling and development activities, such as GLP toxicology studies, drug substance and drug product manufacturing, lab-developed test and companion diagnostic development, and the conduct of our clinical trials. We account for research and development costs on a program-by-program basis. In the early phases of research and discovery, our costs are often related to conducting target screening, evaluation and validation activities and conducting research activities with respect to selected targets and target pathways and are not necessarily allocable to a specific program. We assign costs for such activities to a distinct non-program related project code. We allocate research and development management, overhead, common usage laboratory supplies and facility costs on a full-time equivalent basis.

The following is a comparison of research and development expenses for the years ended December 31, 2018, 2017 and 2016:

	Year Ended December 31,		
(in millions)	**2018**	**2017**	**2016**
Development programs:			
Cabiralizumab	$ 15.8	$ 29.5	$ 19.9
Bemarituzumab	63.1	34.8	21.9
FPA150	18.8	19.0	—
FP-1039	0.1	1.6	0.3
Subtotal development programs	97.8	84.9	42.1
Preclinical programs	19.1	32.5	18.3
Discovery collaborations	3.3	4.0	8.1
Early research and discovery	36.2	29.5	25.6
Total research and development expenses	$ 156.4	$ 150.9	$ 94.1

We expect that most of the research and development expenses we incur will continue to relate to activities to support our clinical development programs, preclinical programs and other research efforts. Our research and development expenses may increase as we advance our current product candidates through clinical development and additional product candidates into preclinical and clinical development, in particular, as we increase the number and size of our clinical trials, including by advancing into registrational trials, and as we expand our internal immuno-oncology preclinical, research and discovery efforts.

In January 2019, we implemented a corporate restructuring to focus our resources on our clinical development and late-stage research programs. Pursuant to the restructuring, we eliminated 41 employee positions, representing approximately 20% of our then-current headcount, primarily in areas relating to research, pathology and manufacturing.

We estimate approximately $2 million of pre-tax charges for severance and other costs related to the restructuring, primarily during the first quarter of 2019.

The process to obtain marketing approval of a drug candidate, including preclinical and clinical development and the development of manufacturing processes, is costly and time-consuming. We or our partners may never succeed in achieving marketing approval for any of our drug candidates. Numerous factors may affect the probability of success for each drug candidate, including preclinical and clinical results, competition, manufacturing capability and commercial viability.

The successful development of our drug candidates is highly uncertain and may not result in products that are approved for marketing by the FDA or any comparable foreign regulatory authority. The costs and duration of the processes necessary to achieve marketing approval for each drug candidate can vary significantly and are difficult to predict. Given the uncertainty associated with clinical trial patient enrollment and the risks inherent in the development process, estimating the duration and completion costs of current or future clinical trials of our drug candidates or if, or to what extent, we will generate revenues from the commercialization and sale of any of our approved drug candidates is difficult and uncertain. We anticipate we will make determinations as to which programs to pursue and how much funding to direct to each program on an ongoing basis in response to the outcome of research, preclinical and clinical activities with respect to each drug candidate, as well as ongoing assessments as to each drug candidate's commercial potential. We will need to raise additional capital and may seek to enter into additional collaborations in the future to advance and complete the development and commercialization of our current and future drug candidates.

General and Administrative

General and administrative expenses consist primarily of salaries and related benefits, including associated stock-based compensation, related to our executive, finance, legal, business development, human resource and support functions. Other general and administrative expenses include allocated facility-related costs not otherwise included in research and development expenses, travel expenses and professional fees for auditing and tax and legal services, including intellectual property-related legal services.

Our general and administrative expenses may increase due to expanded operations to support our increased research and development activities. Also, we expect our intellectual property-related legal expenses, including those related to preparing, filing and prosecuting patent applications and maintaining patents, to increase as our intellectual property portfolio expands.

Interest Income

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

Other (Expense) Income, Net

Other (expense) income, net consists primarily of the gain or loss on the disposal of property and equipment, if any.

Results of Operations

Comparison for the Years Ended December 31, 2018 and 2017

	Year Ended December 31,	
(in millions)	**2018**	**2017**
Collaboration and license revenue	$ 49.9	$ 39.5
Operating expenses:		
Research and development	156.3	150.9
General and administrative	39.7	40.0
Total operating expenses	196.0	190.9
Interest income	5.8	3.0
Other expense, net	(0.1)	(0.1)
Loss before income tax	(140.4)	(148.5)
Income tax benefit (provision)	—	(1.7)
Net loss	$ (140.4)	$ (150.2)

Collaboration and License Revenue

Collaboration and license revenue increased by $10.4 million, or 26%, to $49.9 million for the year ended December 31, 2018 from $39.5 million for the year ended December 31, 2017. This increase was primarily due to $25.0 million of revenue recognized under our Cabiralizumab Collaboration Agreement with BMS for the achievement of the developmental milestone for the dosing of the first patient in BMS's Phase 2 clinical trial of cabiralizumab in combination with *Opdivo*, with and without chemotherapy, as a treatment for patients with second-line pancreatic cancer as well as an increase of $5.1 million of collaboration and license revenue from our collaboration with Zai Lab. This increase was offset by a $10.3 million decrease in research and development funding from our Original Collaboration Agreement with BMS as our Phase 1a/1b combination trial completed enrollment, a $5.0 million decrease related to a 2017 developmental contingent payment from our Immuno-Oncology Research Collaboration with BMS, a $3.0 million decrease from the Fibrosis and CNS collaboration with UCB due to the completion of the performance obligation under this agreement, a $0.9 million decrease from our Immuno-Oncology Research Collaboration with BMS and a $0.5 million decrease in revenue from the Respiratory Diseases Collaboration with GSK.

Research and Development

Our research and development expenses increased by $5.4 million, or 3.6%, to $156.3 million for the year ended December 31, 2018 from $150.9 million for the year ended December 31, 2017. This increase was due to $10.4 million in milestone payments associated with the first patient dosed in our Phase 3 FIGHT trial, a $4.4 million increase in the cost to develop companion diagnostics for use in our bemarituzumab development program, a $3.0 million increase in facility and depreciation costs, a $2.6 million increase in clinical trial expenses, a $1.9 million increase in expense related to temporary resources and a $1.5 million increase in lab supplies and other lab costs. These increases were offset by a $10.6 million decrease in manufacturing costs to advance our FPA150 and FPT155 programs and the FPA154 program, which we terminated in 2017, a $7.4 million decrease in preclinical expense to advance FPA150 towards clinical development and for preclinical expense, including licensing fees associated with FPA154 and a $0.3 million decrease in employee compensation.

General and Administrative

Our general and administrative expenses decreased by $0.3 million, or 0.7%, to $39.7 million in 2018 from $40.0 million in 2017. This decrease was primarily due to a $2.7 million decrease in compensation costs and a $0.5 million decrease in facilities expense related to our corporate office and laboratory facility offset by increases of $2.4 million in expense related to temporary resources and $0.6 million in other miscellaneous costs.

Income Tax Benefit (Provision)

We recognized a tax expense of $1.7 million in 2017 related to deficiency interest based on the Internal Revenue Service reducing our tentative net operating loss carryback refund claim filed in March 2017.

Comparison of the Years Ended December 31, 2017 and 2016

	Year Ended December 31,	
(in millions)	**2017**	**2016**
Collaboration and license revenue	$ 39.5	$ 30.7
Operating expenses:		
Research and development	150.9	94.1
General and administrative	40.0	35.8
Total operating expenses	190.9	129.9
Interest income	3.0	2.5
Other expense, net	(0.1)	-
Loss before income tax	(148.5)	(96.7)
Income tax (provision) benefit	(1.7)	31.0
Net loss	$ (150.2)	$ (65.7)

Collaboration and License Revenue

Collaboration and license revenue increased by $8.8 million, or 28.7%, to $39.5 million in 2017 from $30.7 million in 2016. This increase was primarily due to the $9.3 million increase in revenue from our Original Collaboration Agreement with BMS and a $4.3 million increase in revenue, primarily from a $5.0 million developmental contingent payment from our Immuno-Oncology Research Collaboration with BMS, offset by a $4.5 million decrease in revenue recognized under our Respiratory Diseases Collaboration with GSK as the research term ended in July 2016.

Research and Development

Our research and development expenses increased by $56.8 million, or 60.4%, to $150.9 million in 2017 from $94.1 million in 2016. This increase was primarily due to an increase of $19.0 million to advance our FPA150 development program, which was included in preclinical programs before 2017. There was also an increase of $14.2 million to further advance our preclinical programs toward filing INDs, a $9.6 million to advance cabiralizumab in our Phase 2 clinical trial in diffuse pigmented villonodular synovitis, or PVNS, and our Phase 1a/1b clinical trial in immuno-oncology, a $12.9 million increase to advance our bemarituzumab development program and a $1.3 million increase for our FP-1039 program.

General and Administrative

Our general and administrative expenses increased by $4.2 million, or 11.7%, to $40.0 million in 2017 from $35.8 million in 2016, primarily due to a $1.6 million increase in overhead and facilities expense related to our corporate office and laboratory facility, a $1.0 million increase in stock-based compensation costs, a $0.7 million increase in spending associated with the development of our commercialization strategy and a $0.6 million increase in compensation costs.

Income Tax Benefit (Provision)

We recognized a tax expense of $1.7 million in 2017 related to deficiency interest based on the Internal Revenue Service reducing our tentative net operating loss carryback refund claim filed in March 2017. Our income tax benefit for 2016 relates to our ability to carry back 2016 losses to the 2015 tax year and to obtain a refund of taxes paid related to a prior period.

Liquidity and Capital Resources

As of December 31, 2018, we had $270.1 million in cash, cash equivalents and marketable securities invested in a money market fund, U.S. Treasury securities and commercial paper with maturities of 10 months or less.

In January 2018, we closed on a public offering of 5,897,435 shares of our common stock, which included 769,230 shares sold upon the underwriters' full exercise of their option to purchase additional shares, resulting in aggregate gross proceeds of $115.0 million, before deducting underwriting discounts and commissions and estimated offering expenses payable by us, and net proceeds of approximately $107.6 million after deducting these amounts.

On November 6, 2018, we filed a shelf registration on Form S-3 with the SEC for the issuance and sale of up to an aggregate of $250.0 million in shares of our common stock.

In addition to our existing cash and cash equivalents, we are eligible to receive research and development funding and to earn milestone and other contingent payments for the achievement of defined collaboration objectives and certain nonclinical, clinical, regulatory and sales-based events and royalty payments under our collaboration agreements. Our ability to earn these milestone and contingent payments and the timing of these milestones is primarily dependent upon the outcome of our collaborators’ and licensees’ research and development activities and is uncertain at this time. Our rights to payment under our collaboration and license agreements are our only committed external sources of funds.

Funding Requirements

Our primary uses of capital are, and we expect will continue to be, compensation and related expenses, third-party clinical and preclinical research and development services, including clinical trial, manufacturing, laboratory and related supplies, legal, patent and other regulatory expenses and general overhead costs. We believe our use of CROs and CMOs provides us with flexibility in managing our spending and limits our cost commitments at any point in time.

Because our product candidates are in various stages of clinical and preclinical development and the outcome of these efforts is uncertain, we cannot estimate the actual amounts necessary to successfully complete the development and commercialization of our product candidates or whether, or when, we may achieve profitability. Until such time, if ever, that we can generate substantial product revenues, we expect to finance our cash needs primarily through equity financings and collaboration and licensing arrangements. Except for any obligations of our collaborators to reimburse us for research and development expenses or to make milestone or royalty payments under our agreements with them, we will not have any committed external sources of liquidity. To the extent that we raise additional capital through the future sale of equity or debt, the ownership interests of our stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our existing stockholders. If we raise additional funds through collaboration or licensing arrangements in the future, we may have to relinquish valuable rights to our technologies, future revenue streams or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings when needed, we may be required to delay, limit, reduce or terminate our product development or future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

Based on our research and development plans and our timing expectations related to the progress of our programs, we expect that our existing cash and cash equivalents and marketable securities as of December 31, 2018 will enable us to fund our operating expenses and capital expenditure requirements for at least the next twelve months.

Cash Flows

The following is a summary of cash flows for the years ended December 31, 2018, 2017 and 2016:

	Year Ended December 31,		
(in millions)	**2018**	**2017**	**2016**
Net cash used in operating activities	$ (122.5)	$ (112.2)	$ (79.8)
Net cash (used in) provided by investing activities	(2.5)	174.2	(53.7)
Net cash provided by (used in) financing activities	109.2	(9.9)	(8.9)

Net Cash Used in Operating Activities

Net cash used in operating activities was $122.5 million during the year ended December 31, 2018. The net loss of $140.4 million was offset by non-cash charges of $29.5 million for stock-based compensation expense and $3.3 million for amortization of property and equipment and of premium on marketable securities. The net change in operating assets and liabilities was $14.8 million.

Net cash used in operating activities was $112.2 million during the year ended December 31, 2017. The net loss of $150.2 million was offset by non-cash charges of $34.2 million for stock-based compensation expense, $1.6 million for amortization of premium on marketable securities and $2.5 million for depreciation and amortization. The net change in operating assets and liabilities was $0.4 million.

Net cash used in operating activities was $79.8 million during the year ended December 31, 2016. The net loss of $65.7 million was offset by non-cash charges of $32.9 million for stock-based compensation expense, $15.1 million for deferred income taxes, $4.2 million for amortization of premium on marketable securities and $1.7 million for depreciation and amortization. The net change in operating assets and liabilities was $71.1 million, which is primarily due to a $52.8 million decrease in income tax payable and a $16.8 million decrease in deferred revenue from the recognition of revenue in the current period for cash received from collaboration partners in prior periods

Net Cash Provided by (Used in) Investing Activities

Net cash used in investing activities was $2.5 million for the year ended December 31, 2018. Net cash used in investing activities primarily relates to payments for the purchases of property and equipment of $11.3 million during the year ended December 31, 2018. The property and equipment purchases consisted primarily of charges related to tenant improvement to our corporate office and laboratory facility and purchases of laboratory equipment to support our research and development activities. This was offset by the maturities of marketable securities exceeding the purchase of such marketable securities by $8.8 million.

Net cash provided by investing activities was $174.2 million for the year ended December 31, 2017. Net cash provided by investing activities for the period presented primarily relates to maturities of marketable securities exceeding purchase of such marketable securities by $179.1 million. Payments for the purchases of property and equipment was $4.9 million during the year ended December 31, 2017. The property and equipment purchases consisted primarily of purchases of laboratory equipment to support our research and development activities.

Net cash used in investing activities was $53.7 million for the year ended December 31, 2016. Net cash provided by investing activities for the period presented primarily relates to the purchase of marketable securities exceeding the maturities of such marketable securities by $50.8 million. Payments for the purchases of property and equipment was $3.0 million during the year ended December 31, 2016. The property and equipment purchases consisted primarily of purchases of laboratory equipment to support our research and development activities.

Net Cash Provided by (Used in) Financing Activities

Net cash provided by financing activities was $109.2 million during the year ended December 31, 2018, which consisted primarily of $107.6 million in net proceeds from the public offering of our common stock in January 2018 and $4.0 million received from employee stock option exercises. This was offset by $2.4 million paid to satisfy tax withholding obligations from the net share issuance of restricted stock awards.

Net cash used in financing activities was $9.9 million during the year ended December 31, 2017, primarily related to $13.9 million paid to satisfy tax withholding obligations from the net share issuance of restricted stock awards offset by $4.0 million received from employee stock option exercises and employee stock purchases in 2017.

Net cash used in financing activities was $8.9 million during the year ended December 31, 2016, primarily related to $14.1 million paid to satisfy tax withholding obligations from the net share issuance of restricted stock awards and $3.1 million from excess tax benefits from employee equity incentive plans, offset by $8.3 million received from employee stock option exercises and employee stock purchases in 2016.

Contractual Obligations and Contingent Liabilities

The following table summarizes our significant contractual obligations as of December 31, 2018:

(in millions) Contractual Obligations	Total	Less Than 1 Year	1 to 3 Years	3 to 5 Years	More Than 5 Years
Operating leases (1)	$ 73,601	$ 7,315	$ 15,269	$ 15,851	$ 35,166
Total obligations	$ 73,601	$ 7,315	$ 15,269	$ 15,851	$ 35,166

(1) Represents future minimum lease payments under non-cancelable operating leases in effect as of December 31, 2018 for our corporate office and laboratory facility in South San Francisco, California and sequencing instruments to support our FPA144 program. The minimum lease payments for our corporate office and laboratory facility above do not include common area maintenance charges or real estate taxes. The minimum lease payments for the sequencing instruments do not include installation and initiation.

The contractual obligations table above does not include any potential future milestone payments to third-parties as part of certain collaboration and in-licensing agreements, which could total up to $145.5 million, or any potential future royalty payments we may be required to make under our license agreements, including with:

- Galaxy, under which we were granted an exclusive worldwide license for the development, manufacturing and commercialization of anti-FGFR2b antibodies;
- BioWa-Lonza, under which we were granted a non-exclusive license to use their Potelligent® CHOK1SV technology, including the CHOK1SV cell line, and a non-exclusive license to related know-how and patents; and
- Adimab, under which Adimab conducted programs to discover and evaluate antibodies directed against targets of interest to us and under which we licensed certain of these antibodies

Payments under these agreements are not included in the above contractual obligations table due to the uncertainty of the occurrence of the events requiring payment under these agreements, including our share of potential future milestone and royalty payments. These payments generally become due and payable only upon achievement of certain clinical development, regulatory or commercial milestones.

Off-Balance Sheet Arrangements

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

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

The market risk inherent in our financial instruments and in our financial position reflects the potential losses arising from adverse changes in interest rates and concentration of credit risk. As of December 31, 2018, we had cash and cash equivalents and marketable securities of $270.1 million, consisting of bank deposits, interest-bearing money market accounts, a U.S. Treasury money market fund, U.S. Treasury securities, agency bonds, corporate bonds and commercial paper. Our primary exposure to market risk is interest rate sensitivity, which is affected by changes in the general level of U.S. interest rates. Our cash equivalents and marketable securities have an average maturity of approximately four months and the longest maturity is ten months. Due to the short-term maturities of our cash equivalents and marketable securities and the low risk profile of our marketable securities, an immediate 100 basis point change in interest rates would not have a material effect on the fair market value of our cash equivalents and marketable securities. We can hold our marketable securities until maturity, and we therefore do not expect a change in market interest rates to affect our operating results or cash flows to any significant degree.

Item 8. Financial Statements and Supplementary Data.

The financial statements required by this item are set forth beginning on page F-1 of this Annual Report on Form 10-K.

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

As of December 31, 2018, management, with the participation of our disclosure committee, performed an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as defined in Rules 13a-15(e) and 15d-15(e) of the Exchange Act. Our disclosure controls and procedures are designed to ensure that information required to be disclosed in the reports we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including the Chief Executive Officer and the Chief Financial Officer, to allow timely decisions regarding required disclosures.

Any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objective. Based on this evaluation, our Chief Executive Officer and Chief Financial Officer concluded that, as of December 31, 2018, the design and operation of our disclosure controls and procedures were effective.

Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act. Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles, or GAAP. Our internal control over financial reporting includes those policies and procedures that: (i) pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of our assets, (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that our receipts and expenditures are being made only in accordance with authorizations of our management and directors, and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on our financial statements.

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 risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2018 based on the criteria established in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 Framework), or COSO. Based on our evaluation under the criteria set forth in Internal Control - Integrated Framework issued by COSO, our management concluded our internal control over financial reporting was effective as of December 31, 2018.

Our independent registered public accounting firm, Ernst & Young LLP, audited the effectiveness of our internal control over financial reporting. Ernst & Young LLP has issued their attestation report which is included herein.

Changes in Internal Control over Financial Reporting.

There have been no significant changes in our internal control over financial reporting during our most recent fiscal quarter that materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Five Prime Therapeutics, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Five Prime Therapeutics, Inc.'s (the "Company") internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Five Prime Therapeutics, Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the balance sheets of the Company as of December 31, 2018 and 2017, and the related statements of operations, comprehensive income (loss), stockholders' equity and cash flows for each of the three years in the period ended December 31, 2018 and the related notes, and our report dated February 26, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Annual Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the 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 audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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 risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP
San Francisco, California
February 26, 2019

Item 9B. Other Information.

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by this item is incorporated by reference to the information set forth in the sections titled "Information About Our Board of Directors" and "Information About Our Executive Officers Who Are Not Directors," "Corporate Governance," "Corporate Governance – Code of Business Conduct and Ethics," "Section 16(a) Beneficial Ownership Reporting Compliance," "Corporate Governance – Committees of the Board of Directors – Nominating and Corporate Governance Committee," "Corporate Governance – Committees of the Board of Directors – Audit Committee" and "Corporate Governance – Committees of the Board of Directors – Compensation Committee" in our Proxy Statement.

Item 11. Executive Compensation.

The information required by this item is incorporated by reference to the information set forth in the sections titled "Executive Compensation," "Director Compensation" and "Committees of the Board of Directors — Compensation Committee Interlocks and Insider Participation" in our Proxy Statement.

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

The information required by this item is incorporated by reference to the information set forth in the sections titled "Securities Authorized For Issuance Under Equity Compensation Plans" and "Security Ownership of Certain Beneficial Owners and Management" in our Proxy Statement.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by this item is incorporated by reference to the information set forth in the sections titled "Corporate Governance – Board of Directors Independence" and "Transactions With Related Persons" in our Proxy Statement.

Item 14. Principal Accountant Fees and Services.

The information required by this item is incorporated by reference to the information set forth in the sections titled "Independent Registered Public Accounting Firm Fees and Services" in our Proxy Statement.

PART IV

Item 15. Exhibits and Financial Statement Schedules.

The financial statements schedules and exhibits filed as part of this Annual Report on Form 10-K are as follows:

(a)(1) Financial Statements

Reference is made to the financial statements included in Item 8 of Part II hereof.

(a)(2) Financial Statement Schedules

All other schedules are omitted because they are not required or the required information is included in the financial statements or notes thereto.

(a)(3) Exhibits

The exhibits required to be filed as part of this report are listed in the Exhibit List attached hereto and are incorporated herein by reference.

Exhibit No.	Description
3.1	Amended and Restated Certificate of Incorporation (incorporated herein by reference to Exhibit 3.1 to the company's Current Report on Form 8-K (File No. 001-36070), filed with the SEC on September 23, 2013).
3.2	Amended and Restated Bylaws (incorporated herein by reference to Exhibit 3.4 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
4.1	Specimen common stock certificate (incorporated herein by reference to Exhibit 4.1 to the company's Amendment No. 3 to the Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on September 4, 2013).
10.1+	2002 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.2 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.2+	Form of Option Agreement under 2002 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.3 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.3+	2010 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.4 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.4+	Form of Option Agreement under 2010 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.5 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.5+	2013 Omnibus Incentive Plan (incorporated herein by reference to Exhibit 4.8 to the company's Registration Statement on Form S-8 (File No. 333-191700), filed with the SEC on October 11, 2013).
10.6+	Amendment No. 1 to Omnibus Incentive Plan (incorporated herein by reference to Exhibit 10.4 to the company's Quarterly Report on Form 10-Q (File No. 001-36070), filed with the SEC on November 6, 2017).

Exhibit No.	Description
10.7+	Form of Incentive Stock Option Agreement under 2013 Omnibus Incentive Plan (incorporated herein by reference to Exhibit 10.7 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.8+	Form of Non-Qualified Option Agreement under 2013 Omnibus Incentive Plan (incorporated herein by reference to Exhibit 10.8 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.9+	Form of Restricted Stock Agreement under 2013 Omnibus Incentive Plan (incorporated herein by reference to Exhibit 10.9 to the company's Registration Statement on Form S-1 (File No. 333-193491), filed with the SEC on January 22, 2014).
10.10+	2013 Employee Stock Purchase Plan (incorporated herein by reference to Exhibit 4.11 to the company's Registration Statement on Form S-8 (File No. 333-191700), filed with the SEC on October 11, 2013).
10.11+	Offer Letter Agreement by and between the company and Aron M. Knickerbocker, dated as of October 18, 2017 (incorporated herein by reference to Exhibit 10.2 to the company's Quarterly Report on Form 10-Q (File No. 001-36070), filed with the SEC on November 6, 2017).
10.12+	Offer Letter Agreement by and between the company and Marc L. Belsky, dated as of September 3, 2009 (incorporated herein by reference to Exhibit 10.12 to the company's Registration Statement on Form S-1 (File No. 333-193491), filed with the SEC on January 22, 2014).
10.13+	Offer Letter Agreement by and between the company and Francis Sarena, dated as of December 2, 2010 (incorporated herein by reference to Exhibit 10.10 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.14+	Offer Letter Agreement by and between the company and Bryan Irving, dated as of July 27, 2017.
10.15+	Offer Letter Agreement by and between the company and David V. Smith, dated as of October 24, 2018.
10.16+	Offer Letter Agreement by and between the company and Lewis T. Williams, dated as of November 17, 2017 (incorporated herein by reference to Exhibit 10.17 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on February 27, 2018).
10.17+	Offer Letter by and between the company and Helen Collins, dated as of May 12, 2016 (incorporated herein by reference to Exhibit 10.18 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on February 27, 2018).
10.18+	Executive Severance Benefits Agreement by and between the company and Lewis T. Williams, dated as of April 19, 2007 (incorporated herein by reference to Exhibit 10.11 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.19+	Executive Severance Benefits Agreement by and between the company and Aron M. Knickerbocker, dated as of December 30, 2009 (incorporated herein by reference to Exhibit 10.12 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.20+	Amendment No. 1 to the Executive Severance Benefits Agreement by and between the company and Aron M. Knickerbocker, effective December 5, 2012 (incorporated herein by reference to Exhibit 10.13 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.21+	Amendment No. 2 to the Executive Severance Benefits Agreement by and between the company and Aron M. Knickerbocker, effective October 18, 2017 (incorporated herein by reference to Exhibit 10.3 to the company's Quarterly Report on Form 10-Q (File No. 001-36070), filed with the SEC on November 6, 2017).

Exhibit No.	Description
10.22+	Executive Severance Benefits Agreement by and between the company and Marc L. Belsky, dated as of December 30, 2009 (incorporated herein by reference to Exhibit 10.17 to the company's Registration Statement on Form S-1 (File No. 333-193491), filed with the SEC on January 22, 2014).
10.23+	Executive Severance Benefits Agreement by and between the company and Francis Sarena, dated as of February 18, 2011 (incorporated herein by reference to Exhibit 10.14 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.24+	Amendment No. 1 to the Executive Severance Benefits Agreement by and between the company and Francis Sarena, effective May 8, 2013 (incorporated herein by reference to Exhibit 10.15 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
10.25+	Amendment No. 1 to the Executive Severance Benefits Agreement by and between the company and Marc Belsky, effective January 16, 2014 (incorporated herein by reference to Exhibit 10.18 to the company's Registration Statement on Form S-1 (File No. 333-193491), filed with the SEC on January 22, 2014).
10.26+	Executive Severance Benefits Agreement by and between the company and Bryan Irving, dated as of September 5, 2017.
10.27+	Executive Severance Benefits Agreement by and between the company and David V. Smith, dated as of November 26, 2018.
10.28+	Executive Severance Benefits Agreement by and between the company and Helen Collins, dated as of March 20, 2017 (incorporated herein by reference to Exhibit 10.30 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on February 27, 2018).
10.29+	Consulting Agreement by and between the company and Marc Belsky, effective as of April 7, 2018 (incorporated herein by reference to Exhibit 10.1 to the company's Quarterly Report on Form 10-Q (File No. 001-36070), filed with the SEC on May 8, 2018).
10.30+	Amendment to Stock Option Agreements by and between the company and Marc Belsky, effective as of April 6, 2018 (incorporated herein by reference to Exhibit 10.2 to the company's Quarterly Report on Form 10-Q (File No. 001-36070), filed with the SEC on May 8, 2018).
10.31+	Form of Retention Award Agreement (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K (File No. 001-36070), filed with the SEC on May 4, 2015).
10.32+	Form of Restricted Stock Agreement (incorporated herein by reference to Exhibit 10.27 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on February 24, 2017).
10.33+	Annual Bonus Plan, effective January 1, 2018 (incorporated herein by reference to Exhibit 10.34 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on February 27, 2018).
10.34+	Form of Indemnification Agreement by and between the company and each of its directors and officers (incorporated herein by reference to Exhibit 10.16 to the company's Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on August 16, 2013).
10.35	Lease by and between the company and HCP Oyster Point III LLC, dated as of December 12, 2016 (incorporated herein by reference to Exhibit 10.34 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on February 24, 2017).
10.36+	Confidential Consulting Agreement by and between the company and FLG Partners, LLC, dated as of April 13, 2018 (incorporated herein by reference to Exhibit 10.3 to the company's Quarterly Report on Form 10-Q (File No. 001-36070), filed with the SEC on May 8, 2018).

Exhibit No.	Description
10.37+	Amendment No. 1 to the Confidential Consulting Agreement by and between the company and FLG Partners, LLC, dated as of October 13, 2018.v
10.38†	Exclusive License Agreement by and between the company and Galaxy Biotech, LLC, dated as of December 22, 2011 (incorporated herein by reference to Exhibit 10.23 to the company's Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on August 16, 2013).
10.39†	Amendment to the Exclusive License Agreement by and between the company and Galaxy Biotech, LLC, dated as of May 16, 2016 (incorporated herein by reference to Exhibit 10.1 to the company's quarterly report on Form 10-Q (File No. 001-36070), filed with the SEC on August 5, 2016).
10.40†	Amendment No. 2 to the Exclusive License Agreement by and between the company and Galaxy Biotech, LLC, dated as of May 30, 2017 (incorporated herein by reference to Exhibit 10.39 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on February 27, 2018).
10.41†	Non-Exclusive License Agreement by and among the company, BioWa, Inc. and Lonza Sales AG, dated as of February 6, 2012 (incorporated herein by reference to Exhibit 10.30 to the company's Amendment No. 1 to the Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on August 16, 2013).
10.42††	Amendment No. 1 to the Non-Exclusive License Agreement by and among the company, BioWa, Inc. and Lonza Sales AG, dated as of June 6, 2013.
10.43††	Amendment No. 2 to the Non-Exclusive License Agreement by and among the company, BioWa, Inc. and Lonza Sales AG, dated as of April 27, 2018.
10.44†	Research Collaboration and License Agreement by and between the company and Bristol-Myers Squibb Company, dated as of March 14, 2014 (incorporated herein by reference to Exhibit 10.1 to Amendment No. 1 the company's Quarterly Report on Form 10-Q (File No. 001-36070), filed with the SEC on August 26, 2014).
10.45†	Amendment No. 1 to the Research Collaboration and License Agreement by and between the company and Bristol-Myers Squibb Company, dated as of January 21, 2016 (incorporated herein by reference to Exhibit 10.47 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on March 11, 2016).
10.46†	License and Collaboration Agreement by and between the company and Bristol-Myers Squibb Company, dated as of October 14, 2015 (incorporated herein by reference to Exhibit 10.49 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on March 11, 2016).
10.47†	License and Collaboration Agreement by and between the company and Zai Lab (Shanghai) Co., Ltd., dated as of December 19, 2017 (incorporated herein by reference to Exhibit 10.44 to the company's Annual Report on Form 10-K (File No. 001-36070), filed with the SEC on February 27, 2018).
10.48††	Amendment No. 1 to the License and Collaboration Agreement by and between the company and Zai Lab (Shanghai) Co., Ltd., dated as of December 21, 2018.
21.1	Subsidiaries of the company (incorporated herein by reference to Exhibit 21.1 to the company's Registration Statement on Form S-1 (File No. 333-190194), filed with the SEC on July 26, 2013).
23.1*	Consent of Independent Registered Public Accounting Firm.
24.1	Power of Attorney (included on the signature page to this Annual Report on Form 10-K).
31.1*	Certification of Principal Executive Officer pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended.

Exhibit No.	Description
31.2*	Certification of Principal Financial Officer pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended.
32.1*	Certifications of Chief 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*	Certifications of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS	XBRL Instance Document.
101.SCH	XBRL Taxonomy Extension Schema Document.
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document.
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document.
101.LAB	XBRL Taxonomy Extension Labels Linkbase Document.
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document.

* Furnished herewith and not deemed to be "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or the Exchange Act, and shall not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Exchange Act.
+ Indicates a management contract or compensatory plan.
† Confidential treatment has been granted for certain portions of this exhibit. These portions have been omitted and filed separately with the SEC.
†† Confidential treatment has been requested for certain portions of this exhibit. These portions have been omitted and filed separately with the SEC.

SIGNATURES

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

Five Prime Therapeutics, Inc.
(Registrant)

Date: February 26, 2019

/s/ Aron Knickerbocker
Aron Knickerbocker
President and Chief Executive Officer
(Principal Executive Officer)

Date: February 26, 2019

/s/ David V. Smith
David V. Smith
Executive Vice President and Chief Financial Officer
(Principal Financial and Accounting Officer)

POWER OF ATTORNEY

Each person whose individual signature appears below hereby authorizes and appoints Aron Knickerbocker and Francis W. Sarena, and each of them, with full power of substitution and resubstitution and full power to act without the other, as his or her true and lawful attorney-in-fact and agent to act in his or her name, place and stead and to execute in the name and on behalf of each person, individually and in each capacity stated below, and to file any and all amendments to this report on Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing, ratifying and confirming all that said attorneys-in-fact and agents or any of them or their or his substitute or substitutes may lawfully do or cause to be done by virtue thereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this report on Form 10-K has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Aron Knickerbocker **Aron Knickerbocker**	Chief Executive Officer, President and Director (Principal Executive Officer)	February 26, 2019
/s/ David V. Smith **David V. Smith**	Executive Vice President and Chief Financial Officer (Principal Financial and Accounting Officer)	February 26, 2019
/s/ Franklin M. Berger **Franklin M. Berger**	Director	February 26, 2019
/s/ Kapil Dhingra, M.B.B.S. **Kapil Dhingra, M.B.B.S.**	Director	February 26, 2019
/s/ Sheila Gujrathi, M.D. **Sheila Gujrathi, M.D.**	Director	February 26, 2019
/s/ Peder Jensen, M.D. **Peder Jensen, M.D.**	Director	February 26, 2019
/s/ Garry Nicholson **Garry Nicholson**	Director	February 26, 2019
/s/ William Ringo **William Ringo**	Chairman of the Board	February 26, 2019
/s/ Lewis T. Williams, M.D., Ph.D. **Lewis T. Williams, M.D., Ph.D.**	Director	February 26, 2019

FIVE PRIME THERAPEUTICS, INC.
FINANCIAL STATEMENTS
YEARS ENDED DECEMBER 31, 2018, 2017 AND 2016

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Five Prime Therapeutics, Inc.

Opinion on the Financial Statements

We have audited the accompanying balance sheets of Five Prime Therapeutics, Inc. (the "Company") as of December 31, 2018 and 2017, and the related statements of operations, comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2018, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 26, 2019 expressed an unqualified opinion thereon.

Adoption of ASU No. 2014-09

As discussed in Note 2 to the financial statements, the Company changed its method of recognizing revenue as a result of the adoption of Accounting Standards Update (ASU) No. 2014-09, Revenue from Contracts with Customers (Topic 606), and the amendments in ASUs 2015-14, 2016-10 and 2016-12 effective January 1, 2018.

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 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. 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 2003.
San Francisco, California
February 26, 2019

FIVE PRIME THERAPEUTICS, INC.

Balance Sheets
(In thousands, except share and per share amounts)

	December 31,	
	2018	**2017**
Assets		
Current assets:		
Cash and cash equivalents	$ 43,953	$ 59,790
Marketable securities	226,185	232,900
Receivables from collaborative partners	5,096	13,133
Prepaid and other current assets	13,334	5,367
Total current assets	288,568	311,190
Restricted cash	1,543	1,543
Property and equipment, net	28,718	30,762
Other long-term assets	2,705	552
Total assets	$ 321,534	$ 344,047
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable	$ 1,972	$ 2,237
Accrued personnel-related expenses	7,383	7,156
Other accrued liabilities	15,348	27,519
Deferred revenue, current portion	1,428	12,713
Deferred rent, current portion	1,356	1,356
Total current liabilities	27,487	50,981
Deferred revenue, long-term portion	10,465	10,223
Deferred rent, long-term portion	18,443	17,641
Commitments and contingencies (Note 11)		
Stockholders' equity:		
Common stock, $0.001 par value; 100,000,000 shares authorized, 35,625,751 issued and 34,745,721 outstanding at December 31, 2018. 28,982,056 issued and 28,178,639 outstanding at December 31, 2017.	34	28
Preferred stock, $0.001 par value, 10,000,000 shares authorized; no shares issued and outstanding	—	—
Additional paid-in capital	559,892	421,257
Accumulated other comprehensive loss	(106)	(476)
Accumulated deficit	(294,681)	(155,607)
Total stockholders' equity	265,139	265,202
Total liabilities and stockholders' equity	$ 321,534	$ 344,047

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

FIVE PRIME THERAPEUTICS, INC.

Statements of Operations
(In thousands, except per share amounts)

	Year Ended December 31,		
	2018	**2017**	**2016**
Collaboration and license revenue	$ 49,868	$ 39,508	$ 30,691
Operating expenses:			
Research and development	156,352	150,908	94,072
General and administrative	39,671	40,002	35,831
Total operating expenses	196,023	190,910	129,903
Loss from operations	(146,155)	(151,402)	(99,212)
Interest income	5,792	2,978	2,467
Other loss, net	(84)	(94)	-
Loss before income tax	(140,447)	(148,518)	(96,745)
Income tax (provision) benefit	—	(1,704)	31,048
Net loss	$ (140,447)	$ (150,222)	$ (65,697)
Basic and diluted net loss per common share	$ (4.13)	$ (5.38)	$ (2.44)
Weighted-average shares used to compute basic and diluted net loss per common share	33,976	27,945	26,955

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

FIVE PRIME THERAPEUTICS, INC.

Statements of Comprehensive Loss
(In thousands)

	Year Ended December 31,		
	2018	**2017**	**2016**
Net loss	$ (140,447)	$ (150,222)	$ (65,697)
Other comprehensive gain (loss):			
Unrealized gain (loss) on marketable securities, net of tax	370	(437)	35
Comprehensive loss	$ (140,077)	$ (150,659)	$ (65,662)

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

FIVE PRIME THERAPEUTICS, INC.

Statements of Stockholders' Equity
(In thousands, except share data)

	Common Stock		Additional Paid-In Capital	Accumulated Other Comprehensive Loss	Retained Earnings (Accumulated Deficit)	Total Stockholders' Equity
	Shares	Amount				
Balances at December 31, 2015	26,116,886	$ 26	$ 372,605	$ (74)	$ 60,649	$ 433,206
Issuance of common stock under equity incentive plans and related excess tax benefits	1,730,340	1	5,199	—	—	5,200
Repurchase of shares to satisfy tax withholding obligations	(338,149)	—	(14,054)	—	—	(14,054)
Stock-based compensation expense	—	—	32,885	—	—	32,885
Other comprehensive gain	—	—	—	35	—	35
Net loss	—	—	—	—	(65,697)	(65,697)
Balances at December 31, 2016	27,509,077	27	396,635	(39)	(5,048)	391,575
Issuance of common stock under equity incentive plans	992,556	1	4,021	—	—	4,022
Repurchase of shares to satisfy tax withholding obligations	(322,994)	—	(13,909)	—	—	(13,909)
Cumulative effect of adoption of ASU 2016-09	—	—	337	—	(337)	—
Stock-based compensation expense	—	—	34,173	—	—	34,173
Other comprehensive loss	—	—	—	(437)	—	(437)
Net loss	—	—	—	—	(150,222)	(150,222)
Balances at December 31, 2017	28,178,639	28	421,257	(476)	(155,607)	265,202
Issuance of common stock upon follow-on public offering, net of issuance costs	5,897,435	6	114,994	—	—	115,000
Issuance costs related to the follow-on public offering	—	—	(7,388)	—	—	(7,388)
Issuance of common stock under equity incentive plans	821,456	—	3,963	—	—	3,963
Repurchase of shares to satisfy tax withholding obligations	(151,809)	—	(2,402)	—	—	(2,402)
Effect of adoption of ASU 2014-09	—	—	—	—	1,373	1,373
Stock-based compensation expense	—	—	29,468	—	—	29,468
Other comprehensive gain	—	—	—	370	—	370
Net loss	—	—	—	—	(140,447)	(140,447)
Balances at December 31, 2018	34,745,721	34	559,892	(106)	(294,681)	265,139

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

FIVE PRIME THERAPEUTICS, INC.

Statements of Cash Flows
(In thousands)

	Year Ended December 31,		
	2018	**2017**	**2016**
Operating activities			
Net income loss	$ (140,447)	$ (150,222)	$ (65,697)
Adjustments to reconcile net loss to net cash used in operating activities:			
Depreciation and amortization	5,020	2,513	1,742
Loss on disposal of property and equipment	38	95	9
Stock-based compensation expense	29,468	34,173	32,885
Amortization of discounts and premiums on marketable securities	(1,750)	1,621	4,187
Excess tax benefits from employee equity incentive plans	—	—	3,123
Deferred income taxes	—	—	15,071
Changes in operating assets and liabilities:			
Receivables from collaborative partners	8,037	(9,174)	95
Income tax receivable	—	4,670	(4,670)
Prepaid, other current assets, and other long-term assets	(10,120)	4,235	(2,999)
Restricted cash	—	—	(1,543)
Accounts payable	(265)	1,903	(1,560)
Accrued personnel-related expenses	227	(801)	1,079
Deferred revenue	(9,670)	(9,070)	(16,771)
Deferred rent	802	3,699	(768)
Income tax payable	—	—	(52,843)
Other accrued liabilities, and other long-term liabilities	(3,854)	4,174	8,909
Net cash used in operating activities	(122,514)	(112,184)	(79,751)
Investing activities			
Purchases of marketable securities	(377,365)	(330,363)	(516,752)
Maturities of marketable securities	386,200	509,500	466,000
Proceeds from disposal of property and equipment	—	12	—
Purchases of property and equipment	(11,331)	(4,941)	(2,961)
Net cash (used in) provided by investing activities	(2,496)	174,208	(53,713)
Financing activities			
Proceeds from public offering of common stock, net of issuance costs	107,612	—	—
Proceeds from issuance of common stock under equity incentive plans	3,963	4,022	8,323
Repurchase of shares to satisfy tax withholding obligations	(2,402)	(13,909)	(14,054)
Excess tax benefits from employee equity incentive plans	—	—	(3,123)
Net cash provided by (used in) financing activities	109,173	(9,887)	(8,854)
Net (decrease) increase in cash and cash equivalents and restricted cash	(15,837)	52,137	(142,318)
Cash, cash equivalents and restricted cash at beginning of period	61,333	9,196	149,971
Cash, cash equivalents and restricted cash at end of period	$ 45,496	$ 61,333	$ 9,196
Supplemental disclosure			
Income taxes paid	$ —	$ 1,704	$ 11,433
Property and equipment purchases included in accrued liabilities	$ 716	$ 9,033	$ 1,232
Tenant improvement by the landlord	$ —	$ 14,324	$ —
Supplemental cash flow information			
Cash and cash equivalents at beginning of period	$ 59,790	$ 7,653	$ 149,971
Restricted cash at beginning of period	1,543	1,543	-
Cash, cash equivalents and restricted cash at beginning of period	61,333	9,196	149,971
Cash and cash equivalents at end of period	$ 43,953	$ 59,790	$ 7,653
Restricted cash at end of period	1,543	1,543	1,543
Cash, cash equivalents and restricted cash at end of period	45,496	61,333	9,196

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

1. Business

Five Prime Therapeutics, Inc. (we, us, our, or the Company) is a clinical-stage biotechnology company focused on discovering and developing innovative protein therapeutics. We were incorporated in December 2001 in Delaware. Our operations are based in South San Francisco, California and we operate in one segment.

We have reclassified certain prior period amounts within our footnotes to conform to our current period presentation.

2. Summary of Significant Accounting Policies

Use of Estimates

The preparation of financial statements in conformity GAAP requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes as of the date of the financial statements. The most significant estimates in the Company's financial statements include the recognition of revenue, stock-based compensation, completeness of clinical trial accruals and income taxes. Management bases its estimates on historical experience and on various other market-specific and relevant assumptions that management believes to be reasonable. Actual results could differ materially from those estimates.

Cash and Cash Equivalents

We consider all highly liquid investments purchased with original maturities of three months or less at the date of purchase to be cash equivalents. Cash equivalents are recorded at face value, or cost, which approximates fair value.

Restricted Cash

Restricted cash consists of a certificate of deposit held by our bank as collateral for a standby letter of credit in the same notional amount by our landlord to secure our obligations under our corporate office and laboratory facility lease entered in December 2016. We are required to maintain this restricted cash balance, the amount of which is subject to reduction starting on January 1, 2023, if certain conditions are met, for the duration of this lease. See Note 11 for further discussion on our lease.

Marketable Securities

All marketable securities have been classified as "available-for-sale" and are carried at fair value, based upon quoted market prices. We consider our available-for-sale portfolio as available for use in current operations. Accordingly, we classify certain investments as short-term marketable securities, even though the stated maturity date may be one year or more beyond the current balance sheet date. Unrealized gains and losses, net of any related tax effects, are excluded from earnings and are included in other comprehensive income or loss and reported as a separate component of stockholders' equity or deficit until realized. Realized gains and losses and declines in value judged to be other than temporary, if any, on available-for-sale securities are included in other income (expense), net. The cost of securities sold is based on the specific identification method. We adjust the amortized cost of securities for amortization of premiums and accretion of discounts to maturity. We include interest on short-term investments in interest income. In accordance with our investment policy, management invests to diversify credit risk and only invests in debt securities with high credit quality, including U.S. government securities.

We periodically evaluate whether declines in the fair value of our investments below their cost are other than temporary. The evaluation includes consideration of the cause of the impairment, including the creditworthiness of the security issuers, the number of securities in an unrealized loss position, the severity and duration of the unrealized losses, whether we have the intent to sell the securities, and whether it is more likely than not that we will be required to sell the securities before the recovery of their amortized cost basis. If we determine that the decline in fair value of an investment is below its accounting basis and this decline is other than temporary, we would reduce the carrying value of the security we hold and record a loss for the amount of such decline. We have not recorded any realized losses or declines in value judged to be other than temporary on our investments in debt securities.

Concentrations of Credit Risk

Financial instruments that potentially subject us to significant concentrations of credit risk consist primarily of cash and cash equivalents and marketable securities. Cash and cash equivalents and marketable securities are invested through banks and other financial institutions in the United States. Such deposits in the United States may be in excess of insured limits.

Fair Value of Financial Instruments

We determine the fair value of financial and nonfinancial assets and liabilities using the fair value hierarchy, which describes three levels of inputs that may be used to measure fair value, as follows:

Level 1—Quoted prices in active markets for identical assets or liabilities;

Level 2—Observable inputs other than Level 1 prices such as quoted prices for similar assets or liabilities, quoted prices for identical or similar assets or liabilities in markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities. For our marketable securities, we review trading activity and pricing as of the measurement date. When sufficient quoted pricing for identical securities is not available, we use market pricing and other observable market inputs for similar securities obtained from various third-party data providers. These inputs either represent quoted prices for similar assets in active markets or have been derived from observable market data; and

Level 3—Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

We determine the fair value of Level 1 assets using quoted prices in active markets for identical assets. We review trading activity and pricing for Level 2 investments as of each measurement date. Level 2 inputs, obtained from various third-party data providers, represent quoted prices for similar assets in active markets and were derived from observable market data, or, if not directly observable, were derived from or corroborated by other observable market data. There were no transfers between Level 1 and Level 2 securities in the periods presented.

In certain cases where there is limited activity or less transparency around inputs to valuation, securities are classified as Level 3 within the valuation hierarchy. We do not have any assets or liabilities measured using Level 3 inputs as of December 31, 2018.

The following table summarizes our financial instruments that were measured at fair value on a recurring basis by level of input within the fair value hierarchy defined above (in thousands):

	December 31, 2018			
		Basis of Fair Value Measurements		
	Total	Level 1	Level 2	Level 3
Assets				
Money market funds	$ 40,849	$ 40,849	$ —	$ —
U.S. Treasury securities	104,140	104,140	—	—
Agency bonds	53,999	53,999	—	—
Corporate bonds	11,893	—	11,893	—
Commercial paper	56,152	—	56,152	—
Certificate of deposit	1,543	—	1,543	—
Total	$ 268,576	$ 198,988	$ 69,588	$ —

	December 31, 2017			
		Basis of Fair Value Measurements		
	Total	Level 1	Level 2	Level 3
Assets				
Money market funds	$ 31,802	$ 31,802	$ —	$ —
U.S. Treasury securities	232,900	232,900	—	—
Certificate of deposit	1,543	—	1,543	—
Total	$ 266,245	$ 264,702	$ 1,543	$ —

Property and Equipment

Property and equipment are stated at cost and depreciated using the straight-line method over the estimated useful lives of the assets, ranging from three to five years. Leasehold improvements are amortized over the shorter of their estimated useful lives or the related lease term.

Impairment of Long-Lived Assets

Long-lived assets include property and equipment. We review the carrying value of long-lived assets for impairment whenever events or changes in circumstances indicate that the assets may not be recoverable. We recognize an impairment loss when the total estimated future cash flows expected to result from the use of the asset and its eventual disposition are less than the carrying amount. Through December 31, 2018, there have been no such impairment losses.

Revenue Recognition

Effective January 1, 2018, we adopted Financial Accounting Standards Board, or FASB, Accounting Standard Update, or ASU 2014-09*, Revenue from Contracts with Customers (Topic 606)*, or Topic 606, using the modified retrospective transition method. We applied the standard to contracts that were not completed at the date of initial application. Topic 606 provides a unified model to determine how revenue is recognized. We determine revenue recognition for arrangements within the scope of Topic 606 by performing the following five steps: (i) identify the contract; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when, or as, the company satisfies a performance obligation.

The terms of our collaborative research and development agreements include upfront and license fees, research, development and other funding or reimbursements, milestone and other contingent payments for the achievement of defined collaboration objectives and certain preclinical, clinical, regulatory and sales-based events, as well as royalties on sales of commercialized products. Arrangements that include upfront payments may require deferral of revenue recognition to a future period until we perform obligations under these arrangements. We record research and development funding payable to us as accounts receivable when our right to consideration is unconditional. The event-based milestone and other contingent payments represent variable consideration, and we use the most likely amount method to estimate this variable consideration. Given the high degree of uncertainty around occurrence of these events, we determine the milestone and other contingent amounts to be fully constrained until the uncertainty associated with these payments is resolved. We will recognize revenue from sales-based royalty payments when or as the sales occur. We will re-evaluate the transaction price in each reporting period as uncertain events are resolved and other changes in circumstances occur.

A performance obligation is a promise in a contract to transfer a distinct good or service and is the unit of accounting in Topic 606. A contract's transaction price is allocated among each distinct performance obligation based on relative standalone selling price and recognized as revenue when, or as, the applicable performance obligation is satisfied. Under Topic 606, we elected to use the practical expedient permitted related to adoption, which does not require us to disclose certain information regarding our remaining performance obligations as of the end of the reporting period prior to the initial date of adoption. Additionally, we elected the practical expedient for certain research and development funding which allows us to recognize revenue in the amount for which we have a right to invoice if our right to consideration is an amount that corresponds directly to the value of our performance completed to date. As a result, we effectively bypass the steps of determining the transaction price and allocating that transaction price to the performance obligation.

Research and Development Expenses

Research and development expenses consist of costs we incur for our own and for sponsored and collaborative research and development activities. Research and development costs are expensed as incurred. Research and development costs consist of salaries and benefits, including associated stock-based compensation, laboratory supplies and facility costs, as well as fees paid to other entities that conduct certain research and development activities on our behalf. We estimate preclinical study and clinical trial expenses based on the services performed pursuant to contracts with research institutions and contract research organizations, or CROs, and clinical manufacturing organizations, or CMOs, that conduct and manage preclinical studies and clinical trials on our behalf based on actual time and expenses incurred by them. Further, we accrue expenses related to clinical trials based on the level of patient activity according to the related agreement. We monitor patient enrollment levels and related activity to the extent reasonably possible and adjust estimates accordingly. If we do not identify costs that we have begun to incur or if we underestimate or overestimate the level of services performed or the costs of these services, our actual expenses could differ from our estimates.

We expense payments for the acquisition and development of technology as research and development costs if, at the time of payment, the technology: is under development; is not approved by the U.S. Food and Drug Administration or other regulatory agencies for marketing; has not reached technical feasibility; or otherwise has no foreseeable alternative future use.

Stock-Based Compensation

We recognize compensation expense using a fair-value-based method for costs related to all share-based payments, including restricted stock awards, or RSAs, and stock option awards. For RSAs, stock-based compensation cost is based on the closing market value of our common stock at the date of grant and is recognized as expense ratably over the requisite service period. For stock option awards, stock-based compensation cost is measured at the grant date, based on the fair-value-based measurement of the award estimated using the Black-Scholes option-pricing model, and is recognized as expense over the requisite service period on a straight-line basis. We account for forfeitures as they occur by reversing any expense recognized for unvested awards.

Income Taxes

We account for income taxes using the liability method, under which deferred tax assets and liabilities are determined based on differences between financial reporting and tax basis of assets and liabilities and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. Valuation allowances are provided when the expected realization of the deferred tax assets does not meet the more-likely-than-not criteria. As a result, deferred tax assets at the end of 2018 and 2017 are subject to a full valuation allowance. We are required to determine whether it is more likely than not that a tax position will be sustained upon examination by the appropriate taxing authorities before any part of the benefit can be recorded in the financial statements. It is our practice to recognize interest and penalties related to unrecognized tax benefits, if any, as a component of income tax expense.

Accounting Pronouncements Adopted in 2018

In May 2014, FASB issued Topic 606, which supersedes nearly all existing revenue recognition guidance under U.S. generally accepted accounting principles, or GAAP. FASB subsequently issued amendments to Topic 606 that have the same effective date and transition date. The core principle of Topic 606 is to recognize revenues when promised goods or services are transferred to customers in an amount that reflects the consideration that is expected to be received for those goods or services. Topic 606 defines a five-step process to achieve this core principle and, in as a result, more judgment and estimates may be required in the course of the revenue recognition process, including with respect to identifying performance obligations in a contract, estimating the amount of variable consideration to include in the transaction price and allocating the transaction price to each separate performance obligation.

We adopted Topic 606, effective January 1, 2018, using the modified retrospective transition method, in which the new standard is applied as of the date of initial adoption. We applied the standard to contracts that were not completed at the date of initial application. We recorded the cumulative effect of initially applying the standard as an adjustment to the opening balance of retained earnings. The adoption of the new revenue recognition guidance resulted in a decrease of $1.4 million to deferred revenue and an increase of $1.4 million to retained earnings as of January 1, 2018. Additionally, we determined that the classification between deferred revenue, current portion, and deferred revenue, long-term portion, changed as a result of adoption of Topic 606. We concluded that we will classify deferred revenue for all licensing and collaboration arrangements as deferred revenue, long-term portion, and will reclassify to deferred revenue, current portion, when the remaining term of the estimated performance period is one year or less.

Our adoption of Topic 606 effective January 1, 2018 affected the following financial statement line items:

Condensed Statements of Operations

	Year Ended December 31, 2018		
(in thousands, except per share data)	**Under Topic 606**	**Under Topic 605**	**Effect of change**
Collaboration and license revenue	$ 49,868	$ 52,329	$ (2,461)
Operating expenses	196,023	196,023	—
Operating loss	$ (146,155)	$ (143,694)	$ (2,461)
Net loss	$ (140,447)	$ (137,986)	$ (2,461)
Net loss per share applicable to common stockholders - basic and diluted	$ (4.13)	$ (4.06)	$ (0.07)

Condensed Balance Sheets

	December 31, 2018		
(in thousands)	**Under Topic 606**	**Under Topic 605**	**Effect of change**
Receivables from collaborative partner	$ 5,096	$ 5,096	$ —
Deferred revenue, current portion	1,428	8,187	(6,759)
Deferred revenue, long-term portion	10,465	2,618	7,847
Accumulated deficit	(294,681)	(293,593)	(1,088)

Condensed Statement of Cash Flows

(in thousands)	Year Ended December 31, 2018		
	Under Topic 606	Under Topic 605	Effect of change
Net loss	$ (140,447)	$ (137,986)	$ (2,461)
Decrease in deferred revenue in connection with Topic 606 adoption	1,373	—	1,373
Changes in operating assets and liabilities			
Receivables from collaborative partner	8,037	8,037	—
Deferred revenue	(11,043)	(12,131)	1,088
Cash, cash equivalents and restricted cash at beginning of period	61,333	61,333	—
Cash, cash equivalents and restricted cash at end of period	45,496	45,496	—

In May 2017, FASB issued *ASU 2017-09, Compensation-Stock Compensation (Topic 718) – Scope of Modification Accounting*, or ASU 2017-09, which amends the scope of modification accounting for share-based payment arrangements. Specifically, an entity would not apply modification accounting to an equity award if the fair value, vesting conditions, and classification of such award are the same immediately before and after the modification. We adopted the standard, effective January 1, 2018, to be applied prospectively to awards modified on or after the effective date. We did not have any arrangements within the scope of ASU 2017-09 as of the adoption date, and therefore the adoption of ASU 2017-09 had no effect on our financial position, results of operations or liquidity.

In November 2016, FASB issued *ASU 2016-18, Statement of Cash Flows (Topic 230) – Restricted Cash*, or ASU 2016-18. ASU 2016-18 requires that a statement of cash flows explain the change during the period in the total of cash, cash equivalents, and amounts generally described as restricted cash or restricted cash equivalents. Therefore, amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. We adopted ASU 2016-18, effective January 1, 2018, to be applied retrospectively and revised the beginning and ending balance of our statement of cash flows to include restricted cash. Other than the change in presentation in the accompanying consolidated statement of cash flows, the adoption of ASU 2016-18 had no effect on our financial position, results of operations or liquidity.

In June 2018, FASB issued *ASU 2018-07, Compensation-Stock Compensation (Topic 718) – Improvements to Nonemployee Share-Based Payment Accounting*, or ASU 2018-07. ASU 2018-07 expanded the scope of Topic 718, which previously included only share-based payments to employees, to include share-based payments issued to nonemployees for goods or services. Consequently, the accounting for share-based payments to nonemployees and employees will be substantially aligned. ASU 2018-07 supersedes *Subtopic 505-50, Equity–Equity-Based Payments to Non-Employees*. ASU 2018-07 is effective for public companies for fiscal years, and interim fiscal periods within those fiscal years, beginning after December 15, 2018. Early adoption is permitted, but no earlier than a company's adoption date of Topic 606. We early adopted ASU 2018-07 in the second quarter of 2018. No adjustment was required as a result of this adoption.

Accounting Pronouncements Not Yet Adopted

In November 2018, FASB issued *ASU No. 2018-18, Collaborative Arrangements (Topic 808)*, or ASU 2018-18, which clarifies when certain transactions between collaborative arrangement participants should be accounted for under Topic 606 and incorporates unit-of-account guidance consistent with Topic 606 to aid in this determination. ASU 2018-18 will become effective January 1, 2020 and will apply to all annual and interim reporting periods thereafter. Early adoption is permitted. ASU 2018-18 should generally be applied retrospectively to the date of initial application of Topic 606. We do not anticipate that the adoption of this standard will have a material effect on our financial statements

In August 2018, the SEC adopted amendments to certain disclosure requirements in Securities Act Release No. 33-10532, Disclosure Update and Simplification. These amendments eliminate, modify, or integrate into other SEC requirements certain disclosure rules. Among the amendments is the requirement to present an analysis of changes in stockholders' equity in the interim financial statements included in quarterly reports on Form 10-Q. The analysis, which can be presented as a footnote or separate statement, is required for the current and comparative quarter and year-to-date interim periods. The amendments are effective for all filings made on or after November 5, 2018. In light of the anticipated timing of effectiveness of the amendments and expected proximity of effectiveness to the filing date for most filers' quarterly reports, the SEC's Division of Corporate Finance issued a Compliance and Disclosure Interpretation related to Exchange Act Forms, or CDI – Question 105.09, that provides transition guidance related to this disclosure requirement. CDI – Question 105.09 states that the SEC would not object if the filer's first presentation of the changes in shareholders' equity is included in its quarterly report on Form 10-Q for the quarter that begins after the effective date of the amendments. As such, we adopted these SEC amendments on November 5, 2018 and will present the analysis of changes in stockholders' equity beginning the first quarter of 2019. We do not anticipate that the adoption of these SEC amendments will have a material effect on our financial position, results of operations, cash flows or shareholders' equity.

In August 2018, FASB issued *ASU 2018-13, Fair Value Measurement - Disclosure Framework (Topic 820)*, or ASU 2018-13. The updated guidance improves the disclosure requirements on fair value measurements. The update will become effective for us beginning in the first quarter of 2020. Early adoption is permitted for any removed or modified disclosures. We are currently assessing the timing and impact of adopting the updated provisions.

In June 2016, FASB issued *ASU 2016-13, Financial Instruments-Credit Losses (Topic 326)*, or ASU 2016-13. ASU 2016-13 requires measurement and recognition of expected credit losses for financial assets. This guidance will become effective for us beginning in the first quarter of 2020 and must be adopted using a modified retrospective approach, with certain exceptions. We do not anticipate that the adoption of this standard will have a material effect on our financial statements.

In February 2016, FASB issued *ASU 2016-02, Leases (Topic 842)*, or ASU 2016-02, which amends existing guidance to require substantially all leases to be recognized by lessees on their balance sheet as a right-of-use asset and corresponding lease liability, including leases currently accounted for as operating leases. ASU 2016-02 will become effective January 1, 2019 and will apply to all annual and interim reporting periods thereafter. Early adoption is permitted. Under ASU 2016-02, agreements executed prior to January 1, 2019 that are currently considered leases are expected to be recognized on the consolidated balance sheet as right-to-use lease assets and lease liabilities. We plan to elect the practical expedients upon transition that will retain the lease classification and initial direct costs for any leases that exist prior to adoption of the standard. We will not reassess whether any contracts entered into prior to adoption are leases. We expect to recognize approximately $50.4 million to $54.8 million in lease liabilities and $31.2 million to $35.6 million in right-of use assets on our balance sheet and derecognize existing deferred tax assets of approximately $4.2 million. Further, we anticipate adoption of the standard will not have a material impact on our statement of operation. We are in the process of updating our controls and procedures for maintaining and accounting for our lease portfolio under the new guidance.

3. Cash Equivalents and Marketable Securities

The following is a summary of our cash equivalents and marketable securities at December 31, 2018 and 2017 (in thousands):

	December 31, 2018			
	Amortized Cost Basis	Unrealized Gains	Unrealized Losses	Estimated Fair Value
Money market funds	$ 40,849	$ —	$ —	$ 40,849
U.S. Treasury securities	104,218	—	(78)	104,140
Agency bonds	54,005	9	(15)	53,999
Corporate bonds	11,897	—	(4)	11,893
Commercial paper	56,171	0	(19)	56,152
Total cash equivalents and marketable securities	267,140	9	(115)	267,034
Less: cash equivalents	(40,849)	—	—	(40,849)
Total marketable securities	$ 226,291	$ 9	$ (115)	$ 226,185

	December 31, 2017			
	Amortized Cost Basis	Unrealized Gains	Unrealized Losses	Estimated Fair Value
Money market funds	$ 31,802	$ —	$ —	$ 31,802
U.S. Treasury securities	233,376	—	(476)	232,900
Total cash equivalents and marketable securities	265,178	—	(476)	264,702
Less: cash equivalents	(31,802)	—	—	(31,802)
Total marketable securities	$ 233,376	$ —	$ (476)	$ 232,900

As of December 31, 2018, the amortized cost and estimated fair value of our available-for-sale securities by contractual maturity are shown below (in thousands):

	Amortized Cost	Estimated Fair Value
Debt securities maturing:		
In one year or less	$ 226,291	$ 226,185
Total marketable securities	$ 226,291	$ 226,185

Our cash equivalents and marketable securities have an average maturity of approximately four months and the longest maturity is ten months. There have been no significant realized gains or losses on our available-for-sale securities for the periods presented. We determined that the gross unrealized losses of $0.1 million on our marketable securities as of December 31, 2018 were temporary in nature and related primarily to interest rate shifts rather than significant changes in the underlying credit quality of the securities that we hold. We currently do not intend to sell these securities prior to maturity and do not consider these investments to be other-than-temporarily impaired at December 31, 2018. There were no sales of available-for-sale securities in any of the periods presented.

4. Property and Equipment

Property and equipment consist of the following (in thousands):

	December 31,	
	2018	2017
Computer equipment and software	$ 2,403	$ 1,892
Furniture and fixtures	968	947
Laboratory equipment	19,579	17,429
Leasehold improvements	22,175	22,175
	$ 45,125	$ 42,443
Less: accumulated depreciation and amortization	(16,407)	(11,681)
Property and equipment, net	$ 28,718	$ 30,762

We entered into a lease agreement with respect to our new corporate office and laboratory facility in December 2016. During fiscal 2017, we acquired $22.2 million of leasehold improvements in connection with our move to the new office. We received lease incentives totaling $14.4 million from our landlord for a portion of the costs of these leasehold improvements.

5. Other Accrued Liabilities

Other accrued liabilities consist of the following (in thousands):

	December 31,	
	2018	2017
Clinical development	$ 10,513	$ 12,580
Manufacturing	1,104	2,835
Trade payable	3,381	3,995
Unpaid leasehold improvements	—	7,742
Other	350	367
Total accrued liabilities	$ 15,348	$ 27,519

6. Stockholders' Equity

We have 110,000,000 shares of authorized capital stock issuable in series, all with a par value of $0.001 per share, of which 100,000,000 shares are designated as common stock and 10,000,000 shares are designated as preferred stock. Our Board is authorized to determine the designation, powers, preferences and rights of any such series. As of December 31, 2018 and 2017, we had 34,745,721 and 28,178,639 shares of common stock outstanding, respectively. There were no shares of preferred stock outstanding as of December 31, 2018 and 2017.

In January 2018, we closed on a public offering of 5,897,435 shares of our common stock, which included 769,230 shares sold upon the underwriters' full exercise of their option to purchase additional shares, resulting in aggregate gross proceeds of $115.0 million, before deducting underwriting discounts and commissions and estimated offering expenses payable by us, and net proceeds of approximately $107.6 million after deducting these amounts

Equity Incentive Plans

Our Board of Directors, or Board, and stockholders previously approved the 2002 Equity Incentive Plan, or the 2002 Plan, and the 2010 Equity Incentive Plan, or the 2010 Plan, and collectively with the 2002 Plan, the Prior Plans. The 2002 Plan terminated in March 2012. In September 2013, our stockholders approved the 2013 Omnibus Incentive Plan, or the 2013 Plan. As of September 23, 2013, the effective date of the 2013 Plan, we suspended the 2010 Plan and no additional awards may be granted under the 2010 Plan. Any shares of common stock covered by awards granted under the Prior Plans that terminate after September 23, 2013 by expiration, forfeiture, cancellation or other means without the issuance of such shares were added to the 2013 Plan reserve.

The initial number of shares of common stock available for issuance under the 2013 Plan was 3,500,000, which includes the 1,069,985 shares of common stock that were available for issuance under the Prior Plans as of the effective date of the 2013 Plan. Unless our Board provides otherwise, beginning on January 1, 2014 and continuing until the expiration of the 2013 Plan, the total number of shares of common stock available for issuance under the 2013 Plan will automatically increase annually on January 1 by 4% of the total number of issued and outstanding shares of common stock as of December 31 of the immediately preceding year. Under the plan, any shares that are forfeited or expired are added back to the shares available for issuance. As of December 31, 2018, 1,884,387 shares of common stock were available for future issuance of options, restricted stock and other stock-based awards under the 2013 Plan.

Incentive stock options may be granted with an exercise price of not less than estimated fair value. Stock options granted to a stockholder owning more than 10% of our voting stock must have an exercise price of not less than 110% of the estimated fair value of the common stock on the date of grant. For all stock options granted prior to our initial public offering, our Board determined the estimated fair value of our common stock. For all stock options granted after the completion of our initial public offering in September 2013, the fair value for our underlying common stock is determined using the closing market price on the date of grant. Stock options are granted with terms of up to ten years and generally vest over a period of four years.

The following table summarizes option activity under our stock plans and related information:

	Options Outstanding			
	Number of Shares	Weighted-Average Exercise Price Per Share	Weighted-Average Remaining Contractual Terms (in years)	Aggregate Intrinsic Value (in thousands)
Balance at January 1, 2018	3,867,645	$ 30.35		
Options granted	858,100	17.05		
Options exercised	(328,585)	8.18		
Options forfeited	(303,640)	34.20		
Options expired	(383,339)	35.69		
Balance at December 31, 2018	3,710,181	28.37	7.05	$ 740,587
Options exercisable at December 31, 2018	2,195,470	26.95	6.03	740,587

The weighted-average grant-date fair value per share of stock options granted during the years ended December 31, 2018, 2017 and 2016 was $10.85, $25.78 and $27.95 per share, respectively. The total intrinsic value of options exercised during the years ended December 31, 2018, 2017 and 2016 was $2.4 million, $5.4 million and $30.8 million, respectively.

We recorded stock-based compensation expense related to options of approximately $17.3 million, $19.7 million and $11.4 million for the years ended December 31, 2018, 2017 and 2016, respectively. As of December 31, 2018, there was $27.9 million of total unrecognized compensation expense that we expect to recognize over a weighted-average period of 2.5 years.

RSAs are share awards that entitle the holder to receive freely tradable shares of our common stock upon vesting and are unforfeitable once fully vested. The fair value of RSAs was based upon the closing sales price of our common stock on the grant date.

The following table summarizes the RSA activity under our stock plans and related information:

	RSAs Outstanding	
	Number of Shares	Weighted-Average Grant-Date Fair Value
Unvested balance at January 1, 2018	803,417	$ 40.24
RSAs granted	715,775	17.62
RSAs vested	(392,136)	34.89
RSAs forfeited	(247,026)	32.66
Unvested balance at December 31, 2018	880,030	26.36

The total fair value on the date of vesting of RSAs that vested in 2018, 2017 and 2016 was $6.2 million, $30.8 million, and $33.2 million, respectively.

We recorded stock-based compensation expense related to RSAs of approximately $11.6 million, $14.0 million and $20.9 million for the years ended December 31, 2018, 2017 and 2016, respectively. As of December 31, 2018, there was $16.6 million of unrecognized compensation cost related to unvested employee and director RSAs that we expect to recognize over a weighted-average period of 1.8 years.

Employee Stock Purchase Plan

In September 2013, our stockholders approved the 2013 Employee Stock Purchase Plan, or the ESPP, which became effective as of September 23, 2013. We initially reserved a total of 250,000 shares of common stock for issuance under the ESPP. Unless our Board provides otherwise, continuing until the expiration of the ESPP, the total number of shares of common stock available for issuance under the ESPP will automatically increase annually on January 1 by the lesser of (i) 1% of the total number of issued and outstanding shares of common stock as of December 31 of the immediately preceding year, or (ii) 300,000 shares of common stock. As of December 31, 2018, 1,138,877 shares of common stock were available for issuance under the ESPP.

Under our ESPP, employees can purchase shares of our common stock based on a percentage of their compensation subject to certain limits. The purchase price per share is equal to the lower of 85% of the fair market value of our common stock on the offering date or the purchase date with a six-month look-back feature. ESPP purchases are settled with common stock from the ESPP's previously authorized and available pool of shares. We issued a total of 100,735 shares under the ESPP in 2018.

The compensation expense related to the ESPP was $0.5 million, $0.5 million and $0.6 million for the years ended December 31, 2018, 2017 and 2016, respectively. As of December 31, 2018, there was $0.2 million of unrecognized compensation cost related to the ESPP, which we expect to recognize over 4.4 months.

Stock-Based Compensation

Total stock-based compensation expense recognized was as follows:

	Year Ended December 31,		
(in thousands)	**2018**	**2017**	**2016**
Research and development	$ 15,426	$ 18,285	$ 17,960
General and administrative	14,042	15,888	14,925
Total	$ 29,468	$ 34,173	$ 32,885

We estimated the fair value of each award using the Black-Scholes option-pricing model based on the date of grant of such award with the following assumptions:

	Options			ESPP		
	Year Ended December 31,			Year Ended December 31,		
	2018	2017	2016	2018	2017	2016
Expected term (years)	5.5-6.3	5.5-6.3	5.5-6.3	0.5	0.5	0.5
Expected volatility	68-70%	66-70%	69-74%	47-94%	42-94%	47-57%
Risk-free interest rate	2.6-2.9%	1.9-2.2%	1.3-1.8%	1.4-2.5%	1.0-1.4%	0.4-0.6%
Expected dividend yield	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

The expected term of options granted represents the period of time that we expect options granted to remain outstanding, which we determined using the simplified method as we have insufficient historical information to provide a basis for estimate. The expected term of the ESPP rights is equal to the six-month look-back period. Volatility for options granted is based on the historical volatility of our stock price since we became publicly traded. Volatility for ESPP rights is equal to our historical volatility over the six-month look-back period. The risk-free interest rate for the expected term of the options is based on the U.S. Treasury yield curve with a maturity equal to the expected term in effect at the time of grant. We have not paid, and do not anticipate paying, cash dividends on our shares of common stock; therefore, the expected dividend yield is zero.

7. Earnings per Share

The computation of basic loss per share is based on the weighted-average number of our common shares outstanding. The computation of diluted loss per share is based on the weighted-average number of our common shares outstanding and dilutive potential common shares, which include shares that may be issued under our equity incentive plans, determined using the treasury stock method.

The following table sets forth the computation of basic and diluted net loss (in thousands, except per share data):

	Year Ended December 31,		
	2018	2017	2016
Numerator:			
Net loss	$ (140,447)	$ (150,222)	$ (65,697)
Denominator:			
Denominator for basic loss per share - weighted-average shares	33,976	27,945	26,955
Denominator for diluted loss per share	33,976	27,945	26,955
Basic and diluted net loss per share	$ (4.13)	$ (5.38)	$ (2.44)

We excluded the following securities from the calculation of diluted net loss per share as the effect would have been antidilutive (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Options to purchase common stock	3,710	3,843	2,981
RSAs	880	886	1,278
Total	4,590	4,729	4,259

8. License and Collaboration Agreements

The following table presents changes during the year ended December 31, 2018 in the balances of our contract assets, including receivables from collaboration partners, and contract liabilities, including deferred revenue.

(in thousands)	Contract Assets
Balance at January 1, 2018	$ 13,133
Additions	39,262
Deductions	(47,299)
Balance at December 31, 2018	$ 5,096

(in thousands)	Contract Liabilities
Balance at January 1, 2018	$ 21,563
Additions for advance billings	4,727
Deductions for performance obligations satisfied in current period	(12,218)
Deductions for performance obligations satisfied in the prior periods in connection with updates to the measure of progress	(2,179)
Balance at December 31, 2018	$ 11,893

Bristol-Myers Squibb Company

Immuno-Oncology Research Collaboration

In March 2014, we entered into a research collaboration and license agreement, or the Immuno-Oncology Research Collaboration, with Bristol-Myers Squibb Company, or BMS, to carry out a research program to (i) discover novel interacting proteins in two undisclosed immune checkpoint pathways, which we refer to as the checkpoint pathways, using our target discovery platform; (ii) further the understanding of target biology with respect to targets in these checkpoint pathways; and (iii) discover and pre-clinically develop compounds suitable for development for human therapeutic uses against targets in these checkpoint pathways. Under the Immuno-Oncology Research Collaboration, we granted BMS an exclusive, worldwide license to research, develop and commercialize products directed towards certain targets in the checkpoint pathways. BMS has an option to take exclusive licenses to additional targets we may identify in these checkpoint pathways pursuant to the research plan under the immuno-oncology research collaboration. Based on data arising from our activities under the research plan, in January 2016, we amended the Immuno-Oncology Research Collaboration to add an additional checkpoint pathway to the research program, for a total of three immune checkpoint pathways.

We received an upfront payment of $20.0 million from BMS in April 2014 in connection with our entry into the Immuno-Oncology Research Collaboration. BMS was obligated to pay us $9.5 million in research funding over the course of the three-year research term based on the research activities currently planned under the research plan. BMS had the option to extend the research term for two additional one-year periods on a year-by-year basis for an additional $2.1 million for each extension, during which extensions we would be obligated to perform additional services as agreed to with BMS and BMS would be obligated to pay us research funding with respect to such services. The initial research term under the Immuno-Oncology Research Collaboration expired in March 2017. In each of December 2016 and December 2017, BMS exercised its option to extend the research term for an additional year to March 2018 and March 2019, respectively. In connection with entering into the Immuno-Oncology Research Collaboration, BMS purchased 994,352 shares of our common stock at a price per share of $21.16, for an aggregate purchase price of $21.0 million. We determined that the purchase price of $21.16 per share exceeded the fair value of our common stock by $2.4 million and, therefore, recorded the $2.4 million as deferred revenue that we are recognizing in the same manner as the $20.0 million upfront payment and research funding. We are eligible to receive certain contingent payments with respect to each target subject to the Immuno-Oncology Research Collaboration and royalties on sales of products related to such targets, if any. In December 2017, we recognized $5.0 million related to a developmental contingent payment.

The Immuno-Oncology Research Collaboration will terminate upon the expiration of all payment obligations under the collaboration. In addition, BMS may terminate the Immuno-Oncology Research Collaboration in its entirety or on a collaboration target-by-collaboration target basis at any time with advance written notice, and either party may terminate the collaboration in its entirety or on a collaboration target-by-collaboration target basis with written notice for the other party's material breach if such other party fails to timely cure the breach or immediately upon certain insolvency events.

We identified one performance obligation under the Immuno-Oncology Research Collaboration for the research license to access our technology, the exclusive commercial license and research activities. BMS's options to select additional collaboration targets are not priced at a discount and therefore do not represent performance obligations for which the transaction price would be allocated. The transaction price of $36.1 million includes the $20.0 million non-refundable upfront fee, $13.7 million of research funding and $2.4 million of equity premium. We concluded that the transaction price should not include the variable consideration related to maintenance fees and unachieved clinical and regulatory development milestones as this consideration was considered to be constrained as it is probable that the inclusion of such variable consideration could result in a significant reversal in revenue in the future. We will recognize any consideration related to sales-based payments (including milestones and royalties) when the related sales occur, as we have determined that these amounts relate predominantly to the license granted and therefore will be recognized on the later to occur of satisfaction of the performance obligation, or the occurrence of the related sales. We will re-evaluate the transaction price at each reporting period. For year ended December 31, 2018, no adjustments were made to the transaction price.

Upon adoption of Topic 606, we recognized an additional $0.7 million of revenue, through a decrease to deferred revenue and an increase to beginning retained earnings, based on the difference between the input method currently used under Topic 606 and the ratable recognition method previously used under Topic 605. Under the input method, we recognize revenue on the basis of our efforts or inputs applicable to the satisfaction of a performance obligation (e.g., resources consumed, labor hours expended, costs incurred, or time elapsed) relative to the total expected inputs applicable to the satisfaction of that performance obligation. We concluded that we will recognize revenue based on actual costs incurred as a percentage of total budgeted costs as we complete our performance obligation. Revenue recognized from the performance obligation was $6.1 million for the year ended December 31, 2018. Through December 31, 2018, we have recognized $34.6 million of the transaction price as collaboration revenue under the agreement. We will recognize the remaining transaction price of $1.5 million as revenue under the input method over the estimated performance period.

For the years ended December 31, 2018, 2017, and 2016, we recognized $6.1 million, $12.0 million and $7.7 million, respectively, of revenue under the Immuno-Oncology Research Collaboration. As of December 31, 2018 and 2017, we had deferred revenue relating to the immuno-oncology research collaboration of $1.5 million and $6.3 million, respectively.

License and Collaboration Agreement

On October 14, 2015, we entered into a license and collaboration agreement, or the Cabiralizumab Collaboration Agreement, pursuant to which we granted BMS exclusive global rights to develop and commercialize certain colony stimulating factor-1 receptor, or CSF1R, antibodies, including our monoclonal CSF1R inhibiting antibody that we refer to as cabiralizumab, and all modifications, derivatives, fragments, or variants of such antibodies, each of which we refer to as a licensed antibody. Under the terms of the Cabiralizumab Collaboration Agreement, BMS is responsible, at its expense, for developing products containing licensed antibodies, each of which we refer to as a licensed product, under a development plan, subject to our option, at our own expense, to conduct certain studies, including registration-enabling studies to support approval of cabiralizumab. BMS is responsible for manufacturing and commercializing each licensed product and we will retain rights to a U.S. co-promotion option. The Cabiralizumab Collaboration Agreement supersedes the clinical trial collaboration agreement we entered into with BMS in November 2014, or the Original Collaboration Agreement. We assessed the two agreements separately as standalone agreements under Topic 606.

We received an upfront payment of $30.0 million from BMS in December 2014 in connection with our entry into the Original Collaboration Agreement. We are completing our Phase 1a/1b clinical trial to evaluate the safety, tolerability and preliminary efficacy of combining *Opdivo*, BMS's programmed-death 1 (PD-1) immune checkpoint inhibitor, with cabiralizumab in multiple tumor types, which we commenced under the Original Collaboration Agreement. BMS bears all costs and expenses relating to this trial, including manufacturing costs for the supply of cabiralizumab, except that we are responsible for our own internal costs, including internal personnel costs.

Under the Original Collaboration Agreement, we identified one performance obligation for the execution of a Phase 1a/1b clinical trial of cabiralizumab in combination with *Opdivo*. The transaction price consists of the $30.0 million non-refundable upfront fee under the Original Collaboration Agreement.

We used the input method to measure progress toward completion of the performance obligation and concluded that we will recognize revenue based on actual costs incurred by our CRO, as a percentage of total budgeted costs as we complete our performance obligation. We will recognize revenue from reimbursements when we have the right to invoice BMS. No adjustment was necessary upon adoption of Topic 606. We recognized $6.6 million of the transaction price as revenue for the year ended December 31, 2018. Total revenue recognized for reimbursements for the year ended December 31, 2018, was $6.9 million. Through December 31, 2018, we recognized $24.8 million of the transaction price as collaboration revenue under the Original Collaboration Agreement. The remaining transaction price of $5.2 million is recorded in deferred revenue as of December 31, 2018 and will be recognized as revenue under the input method over the estimated performance period.

Under the Cabiralizumab Collaboration Agreement, we identified the following performance obligations: (1) license grant to BMS and (2) transfer of licensed know-how to BMS. The transaction price consists of the $350.0 million non-refundable up-front fee. We concluded that the transaction price should not yet include milestone payments that may become due as they are fully constrained. We will recognize any consideration related to royalties when the related sales occur, as we have determined that these amounts relate predominantly to the license granted and therefore will be recognized upon the occurrence of the related sales. We will re-evaluate the transaction price in each reporting period as uncertain events are resolved and other changes in circumstances occur. For the year ended December 31, 2018, no adjustments were made to the transaction price.

The $350.0 million non-refundable upfront fee was fully recognized concurrent with the transfer of the license and know-how in 2015. As such, no adjustment to revenue was necessary under Topic 606. In January 2018, we recognized $25.0 million related to a milestone achieved for the dosing of the first patient in BMS's randomized Phase 2 clinical trial of cabiralizumab in combination with *Opdivo*, with and without chemotherapy, as a treatment for patients with second-line pancreatic cancer.

For the years ended December 31, 2018, 2017, and 2016, we recognized $38.4 million, $23.7 million and $14.4 million, respectively, of revenue under the license and collaboration agreements. As of December 31, 2018 and 2017, we had deferred revenue relating to the license and collaboration agreements of $5.2 million and $11.8 million, respectively.

Zai Lab China License and Collaboration Agreement

In December 2017, we entered into a license and collaboration agreement, or the China Collaboration Agreement, with Zai Lab, pursuant to which we granted Zai Lab an exclusive license to develop and commercialize bemarituzumab in China, Hong Kong, Macau and Taiwan.

Under the terms of the China Collaboration Agreement, Zai Lab will be responsible, at its expense, for (i) developing and commercializing products containing the licensed antibody, each, a licensed product, under a territory development plan and (ii) performing certain development activities to support our global development and registration of licensed products, including our Phase 3 FIGHT trial, in the territory, under a global development plan. Under the terms of the China Collaboration Agreement, Zai Lab paid us a $5.0 million non-refundable and non-creditable upfront fee ($4.2 million after netting of value-added tax withholdings of $0.8 million) in January 2018. Pursuant to the China collaboration agreement, with respect to each licensed product, we are eligible to receive up to $39.0 million of specified developmental and regulatory milestone payments. Zai Lab will also be obligated to pay us a royalty, on a licensed product-by-licensed product and region-by-region basis. In addition, Zai Lab agreed to reimburse us for certain global development activities, which is limited to a maximum of $10.0 million, and certain costs for the development of companion diagnostics.

We identified the following performance obligations: (1) license grant to Zai Lab together with the transfer of licensed know-how, development drug supply and global development activities, or the License Grant and (2) development of companion diagnostics. Zai Lab has the option to purchase commercial drug supply from us pursuant to a separate commercial supply agreement to be negotiated in the future. The commercial drug supply will be accounted for as a separate contract when Zai Lab exercises this option. In our evaluation of the transaction price upon the adoption of Topic 606, the $4.2 million non-refundable upfront fee and $8.3 million of expected reimbursement from Zai Lab for global development activities were included as part of the transaction price of $12.5 million. We estimated the $8.3 million of expected reimbursements from Zai Lab based on the probability-weighted amounts of a range of possible consideration amounts. In September 2018, we recorded a $1.7 million receivable related to Zai Lab's $2.0 million clinical development milestone payment, net of value-added tax and other withholdings of $0.3 million, which became due upon dosing of the first patient in the Phase 3 FIGHT trial. We have since re-evaluated the transaction price and increased the transaction price by $2.2 million to $14.7 million which includes the $4.2 million non-refundable upfront fee, $8.8 million of expected reimbursement from Zai Lab for global development activities and the $1.7 million clinical development milestone payment. We have not included the remaining regulatory milestone payments in the transaction price as all such milestone amounts are fully constrained. We will recognize any consideration related to royalties when the related sales occur, as we determined that these amounts relate predominantly to the license granted and therefore will be recognized upon the occurrence of the related sales. We concluded that the reimbursement of costs incurred for the development of companion diagnostics qualifies for the practical expedient under Topic 606, which allows us to recognize revenue in the amount for which we have a right to invoice if our right to consideration is an amount that corresponds directly to the value to Zai Lab of our performance completed to date. We therefore effectively bypass the steps of determining the transaction price and allocating that transaction price to the performance obligation. We will re-evaluate the transaction price in each reporting period as uncertain events are resolved and other changes in circumstances occur.

We use the input method to measure progress toward completion of the performance obligation for the License Grant. We concluded that revenue will be recognized based on actual costs incurred by our CRO as a percentage of total budgeted costs as we complete our performance obligation. We will recognize revenue from reimbursements for the development of companion diagnostics when we have the right to invoice Zai Lab.

No adjustment was necessary upon adoption of Topic 606. For the year ended December 31, 2018, revenue recognized for the License Grant was $1.7 million. Total revenue recognized for the companion diagnostics development performance obligation was $3.3 million. Of the remaining transaction price of $12.9 million, we recorded $5.2 million in deferred revenue, which we will recognize over the estimated performance period for satisfaction of the performance obligations. The remaining $8.7 million of the transaction price will be recorded in deferred revenue when invoiced as we complete global development activities.

GlaxoSmithKline LLC

Respiratory Diseases and Muscle Diseases Collaborations

In April 2012, we entered into a research collaboration and license agreement, or the Respiratory Diseases Collaboration, with Glaxo Group Limited, or GSK, to identify new therapeutic approaches to treat refractory asthma and chronic obstructive pulmonary disease, or COPD, with a particular focus on identifying novel protein therapeutics and antibody targets. In January 2016, we amended our Respiratory Diseases Collaboration to extend the research term by three months to July 2016 to allow additional validation of the protein targets we discovered and to increase the research funding. In July 2010, we entered into a research collaboration and license agreement, or the Muscle Diseases Collaboration, with GlaxoSmithKline LLC, to identify potential drug targets and drug candidates to treat skeletal muscle diseases. We conducted three customized cell-based screens and one *in vivo* screen of our protein libraries under the muscle diseases collaboration. The research term under the Muscle Diseases Collaboration ended in May 2014 and the agreement terminated in April 2018.

Based on our assessment of the Respiratory Diseases Collaboration and the Muscle Disease Collaboration under Topic 606, we identified one performance obligation under each collaboration for the research license and research activities. The non-refundable upfront fees, the equity premiums and the variable consideration for research activities are included as part of the transaction prices for each collaboration. The clinical and regulatory development milestone payments have not been included in the transaction prices, as all such milestone amounts are fully constrained. We will recognize any consideration related to sales-based payments (including milestones and royalties) when the related sales occur, as we have determined that these amounts relate predominantly to the license granted and therefore will be recognized on the later to occur of satisfaction of the performance obligation, or the occurrence of the related sales. Under the Respiratory Diseases Collaboration, additional research funding that GSK had the option to add was also not included in the transaction price. As the Muscle Diseases Collaboration with GlaxoSmithKline LLC terminated in April 2018, we are no longer eligible to receive milestone payments or royalties under that collaboration. We will re-evaluate the transaction price for the Respiratory Diseases Collaboration in each reporting period as uncertain events are resolved and other changes in circumstances occur. For year ended December 31, 2018, no adjustments were made to the transaction prices of the collaborations with GSK or GlaxoSmithKline LLC.

Under the Respiratory Diseases Collaboration and the Muscle Diseases Collaboration, the non-refundable upfront fees, the equity premiums and the payment for research activities were fully recognized in 2016 and 2014, respectively. As the performance obligations were fully satisfied in prior years, no adjustment to revenue was necessary under Topic 606.

For the years ended December 31, 2018, 2017 and 2016, we recognized $0, $0.5 million and $1.8 million of milestone revenue, respectively, and $0, $0 and $3.2 million of revenue for progress made toward the performance obligation, respectively, under the Respiratory Diseases Collaboration.

UCB Fibrosis and CNS Collaboration

In March 2013, we entered into a research collaboration and license agreement, or the Fibrosis and CNS Collaboration, with UCB Pharma, S.A., or UCB, to identify potential biologics targets and therapeutics in the areas of fibrosis-related immunologic diseases and central nervous system, or CNS, disorders.

Under the terms of the Fibrosis and CNS Collaboration, UCB paid us an upfront payment of $6.0 million in March 2013. In addition, UCB agreed to pay us $6.6 million for a technology fee and $2.0 million for research funding. As of December 31, 2015, we fully collected the technology fees and research funding under the Fibrosis and CNS Collaboration. We are eligible to receive certain evaluation and selection fees and contingent payments with respect to each protein target that UCB elects to obtain an exclusive license, and royalties on the sales of products related to such targets, if any. Our initial research activities under this agreement were completed in March 2016. Upon the completion of those research activities, UCB had up to a two-year evaluation period, which ended in March 2018, during which we were obligated to perform additional services at the request of UCB.

The agreement will terminate upon the expiration of the royalty terms of any products that incorporate or target a protein exclusively licensed under the collaboration. In addition, UCB may terminate this agreement at any time with advance written notice, and either party may terminate the agreement with written notice for the other party's material breach if such other party fails to timely cure the breach or upon certain insolvency events.

Based on our assessment of the Fibrosis and CNS Collaboration under Topic 606, we identified research activities as our only performance obligation. UCB's options to select additional collaboration targets and to license exclusive rights to selected targets are not priced at a discount and therefore do not represent performance obligations for which the transaction price would be allocated. The transaction price of $15.6 million includes the $6.0 million non-refundable upfront fee, the $6.6 million technology access fee, the $1.0 million reimbursement for reagent costs and the $2.0 million of research funding. We have not included the clinical and regulatory development milestone payments in the transaction price as all such milestone amounts are fully constrained. We will recognize any consideration related to sales-based payments (including milestones and royalties) when the related sales occur, as we have determined that these amounts relate predominantly to the license granted and therefore will be recognized on the later to occur of satisfaction of the performance obligation, or the occurrence of the related sales. We will re-evaluate the transaction price in each reporting period as uncertain events are resolved and other changes in circumstances occur. For the year ended December 31, 2018, there was no change in the transaction price.

Upon adoption of Topic 606, we recognized an additional $0.6 million of revenue through a decrease to deferred revenue and an increase to beginning retained earnings, based on the difference between the input method currently used under Topic 606 and the ratable recognition method previously used under Topic 605. We use the input method to measure progress toward completion of the performance obligation and concluded that revenue will be recognized based on actual full time equivalent labor hours expended as a percentage of total budgeted costs. The $0.6 million adjustment recorded upon the adoption of Topic 606 recognized the remainder of the transaction price.

During 2018, 2017 and 2016, we recognized $0.3 million, $0.3 million and $0.4 million in target evaluation and selection fees, respectively. For the years ended December 31, 2018, 2017 and 2016, revenue recognized for the performance obligation was $0, $3.0 million and $3.1 million, respectively. As of December 31, 2017, we had deferred revenue of $0.6 million which was fully recognized upon adoption of Topic 606.

9. Acquired Technologies

Galaxy Biotech, LLC

In December 2011, we entered into an exclusive license agreement with Galaxy Biotech, LLC, or Galaxy, for the development, manufacturing, and commercialization of certain anti-FGFR2b monoclonal antibodies. Under the terms of the agreement, we agreed to pay Galaxy an upfront license payment of $3.0 million. We paid the upfront payment in two equal installments in January 2012 and July 2012. As we had full access to the technology and materials upon execution of the agreement, the lead compound was in an early stage of development, and the underlying technology has no alternative future uses, we recorded the entire upfront payment to research and development expenses in our statement of operations for the year ended December 31, 2011. We are also required to make additional payments based upon the achievement of certain intellectual property, development, regulatory, and commercial milestones, as well as royalties on future net sales of products resulting from development of this purchased technology, if any. In May 2016, we amended the license agreement to revise certain milestone definitions, reduce certain milestone payments and add certain development-related milestone payments that were triggered by dosing of certain patients in the Phase 1 clinical trial of bemarituzumab. We made milestone payments to Galaxy totaling $9.5 million, $0 and $2.5 million in 2018, 2017 and 2016, respectively. In May 2017, we further amended the license agreement to align the net sales definition under the agreement to the net sales definition under any sublicense we may grant under the agreement and to amend the termination provisions to allow for a direct license between Galaxy and any sublicensee upon termination of the agreement.

BioWa, Inc. and Lonza Sales AG

In February 2012, we entered into a license agreement with BioWa, Inc. and Lonza Sales AG, or BioWa-Lonza, pursuant to which BioWa-Lonza granted us a non-exclusive license to use their Potelligent® CHOK1SV technology, including the CHOK1SV cell line, and a non-exclusive license to related know-how and patents. This license is necessary for our bemarituzumab antibody.

In November 2015, we entered into a separate license agreement for the same technology with BioWa-Lonza for our FPA150 antibody program.

We are obligated to pay BioWa-Lonza aggregate milestone payments of up to $24.5 million and $25.4 million, respectively, for development, regulatory and commercialization milestones achieved in our bemarituzumab and FPA150 antibody programs. We are also obligated to pay BioWa-Lonza tiered royalties on net sales up to mid-single digit percentages of the proceeds of such sales. We made milestone payments to BioWa-Lonza under both agreements totaling $1.2 million, $0 and $0, respectively, in 2018, 2017 and 2016.

Our license agreements with BioWa-Lonza will remain in effect until the expiration of our royalty obligations under each agreement, unless earlier terminated. For each licensed product under each agreement, we are obligated to pay BioWa-Lonza royalties on net sales of such licensed product on a country-by-country basis for the longer of the life of the licensed patents covering such licensed product in such country or 10 years after the first commercial sale of such licensed product in a major market country, which includes the United States .

INBRX 110 LP

In July 2015, we entered into a research collaboration and license agreement with INBRX 110 LP, or Inhibrx, to obtain (a) an exclusive, worldwide license to antibodies to GITR for therapeutic and diagnostic uses, and (b) an exclusive option to obtain exclusive, worldwide licenses to multi-specific antibodies developed by Inhibrx that bind to both GITR and other targets.

Pursuant to the agreement, we paid Inhibrx an upfront fee of $10.0 million for the license and for services provided by Inhibrx related to a research cell bank in July 2015. We recorded an expense of $5.0 million for a milestone payment to Inhibrx when the milestone was achieved in May 2017.

We expense payments for the acquisition and development of technology as research and development cost if, at the time of payment, the technology is under development, is not approved by the FDA or other regulatory agencies for marketing, has not reached technical feasibility, or otherwise has no foreseeable alternative future use. In accordance with this policy, we expensed the $8.0 million that we determined to be related to the license upon our entry into the agreement in July 2015 as research and development expense.

In accordance with the ASC 730, *Research and Development Costs*, we concluded that we should defer and capitalize the $2.0 million that we determined to be related to the prepayment for the research cell bank services over the performance period. During both 2016 and 2015, we recognized $1.0 million of expense related to the research cell bank services. As of December 31, 2016, we fully recognized the deferred expense related to this agreement.

On August 28, 2017, we delivered to Inhibrx written notice of termination of the agreement for convenience. Pursuant to the terms of the agreement, the termination became effective on December 27, 2017.

10. Income Taxes

For the year ended December 31, 2018, we did not record any income tax expense as compared to an income tax expense of $1.7 million for the year ended December 31, 2017 and an income tax benefit of $31.0 million for the year ended December 31, 2016.

For the year ended December 31, 2017, the income tax expense related to deficiency interest was based on the Internal Revenue Service reducing our tentative net operating loss carryback refund claim filed in March 2017. For the year ended December 31, 2016, the federal tax benefit represents the reversal of the federal tax provided in 2015 due to our ability to carryback federal tax attributes generated in 2016, but not in an amount that was lower than any minimum taxes as provided under federal law.

The components of our income tax expense (benefit) were as follows:

	Year Ended December 31,		
	2018	2017	2016
Current tax expense (benefit)			
Federal	$ —	$ 1,703	$ (40,740)
State	—	1	(5,340)
Total current expense (benefit)	—	1,704	(46,080)
Deferred tax expense			
Federal	—	—	15,032
State	—	—	—
Total deferred tax expense	—	—	15,032
Total tax expense (benefit)	$ —	$ 1,704	$ (31,048)

The income tax expense (benefit) differs from the amount computed by applying the statutory federal income tax rate as follows (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Federal statutory income tax	$ (29,495)	$ (51,981)	$ (33,862)
State statutory income tax	1	1	(3,471)
Stock compensation	3,698	(4,847)	715
Nontaxable equity premiums	(85)	(168)	(248)
Change in valuation allowance	38,953	41,633	12,152
Remeasurement of deferred taxes	—	27,122	—
Research and orphan drug credits	(13,192)	(11,029)	(8,029)
Interest charge, net of federal benefit	—	1,107	—
Other permanent items	120	(134)	1,695
Income tax expense (benefit)	$ —	$ 1,704	$ (31,048)

On December 22, 2017, the Tax Cuts and Jobs Act of 2017, or the Tax Act, was signed into law. The Tax Act reduces the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%. Although the Tax Act is generally effective on January 1, 2018, GAAP requires recognition of the tax effects of new legislation during the reporting period that includes the enactment date, which was December 22, 2017. Because of the impacts of the Tax Act, the SEC issued Staff Accounting Bulletin No. 118 Income Tax Accounting Implications of the Tax Cuts and Jobs Act (SAB 118) that allows us to record provisional amounts for those impacts, with the requirement that the accounting be completed in a period not to exceed one year from the date of enactment. As a result, as of December 31, 2017, we performed a provisional estimate of the effect of the Tax Act in the financial statements. In the fourth quarter of 2018, we completed our analysis to determine the effect of the Tax Act. No material adjustments were noted from the completion of the analysis as of December 31, 2018. The primary impact of the Tax Act resulted from the re-measurement of deferred tax assets and liabilities due to the change in the corporate tax rate, reducing our deferred tax assets by $27.1 million with a corresponding reduction in our valuation allowance, which had no effect on our effective tax rate.

The tax effects of temporary differences and carryforwards that give rise to significant portions of the deferred tax assets consist of the following (in thousands):

	As of December 31,	
	2018	2017
Net operating loss carryforwards	$ 60,566	$ 39,405
Research and orphan drug credits	58,614	42,070
Deferred revenue	2,410	3,701
Stock-based compensation	7,698	7,017
Capitalized license and depreciation basis differences	3,412	892
Reserves, accruals and tenant improvement allowances	5,639	5,738
Total deferred tax assets	138,339	98,823
Less: valuation allowance	(134,492)	(94,315)
Net deferred tax assets	$ 3,847	$ 4,508
Capitalized license and depreciation basis differences	(3,396)	(4,069)
Prepaid expenses	(451)	(439)
Total deferred tax liabilities	$ (3,847)	$ (4,508)
Total net deferred tax assets	$ —	$ —

Based on all available objective evidence, we determined it is more likely than not that we will not fully realize all our net deferred tax assets. The available objective evidence considered was our inability to further recover any taxes previously paid and expectation of future taxable income. Accordingly, we recorded a valuation allowance against all our net deferred tax assets for the years ended December 31, 2018 and 2017. We will continue to maintain a full valuation allowance on our net deferred tax assets until there is sufficient positive evidence to support the reversal of all or some portion of this allowance. Our valuation allowance increased by $40.2 million and $47.4 million, respectively, during 2018 and 2017.

At December 31, 2018, we had approximately $257.0 million of federal net operating losses available for future use that expire beginning in 2024 and federal research and Orphan Drug credits of approximately $52.2 million available for future use that expire beginning in 2026.

At December 31, 2018, we also had approximately $155.1 million of state net operating losses available for future use that expire beginning in 2028 and state research credits of approximately $21.4 million that have no expiration date.

Utilization of net operating loss and tax credit carryforwards may be subject to an annual limitation due to ownership change limitations provided by the Internal Revenue Code and similar state provisions. Annual limitations may result in expiration of net operating loss and tax credit carryforwards before some or all of such amounts have been utilized.

We had $16.7 million, $13.6 million and $9.4 million of unrecognized tax benefits as of December 31, 2018, 2017 and 2016, respectively. The unrecognized tax benefits are primarily tax credits for all years and state net operating loss carryover related for certain prior years. As of December 31, 2018, we recorded no interest or penalties related to income taxes. Comparatively, we recorded $1.7 million of interest as of December 31, 2017. A reconciliation of our unrecognized tax benefits for the years ended December 31, 2018, 2017 and 2016 is as follows (in thousands):

	Unrecognized Income Tax Benefits
Balance as of December 31, 2015	$ 3,432
Additions for prior year tax positions	4,394
Additions for current year tax positions	1,577
Balance as of December 31, 2016	9,403
Additions for prior year tax positions	691
Additions for current year tax positions	3,490
Balance as of December 31, 2017	13,584
Additions for prior year tax positions	622
Additions for current year tax positions	2,454
Balance as of December 31, 2018	$ 16,660

In the event we are able to recognize these uncertain positions, most of the $16.7 million of the unrecognized tax benefits would reduce our effective tax rate. We currently have a full valuation allowance against our deferred tax assets, which would impact the timing of the effective tax rate benefit, should any of these uncertain positions be favorably settled in the future. We do not believe it is reasonably possible that our unrecognized tax benefits will significantly change within the next twelve months.

We file U.S. and state income tax returns with varying statutes of limitations. The tax years from 2003 forward remain open to examination due to the carryover of unused net operating losses and tax credits. We have no ongoing tax examinations by tax authorities at this time.

11. Commitments and Contingencies

Operating Leases

We entered into a lease agreement for our new corporate office and laboratory facility in December 2016, which we refer to as the lease. We moved into our new corporate office and laboratory facility in December 2017. The lease has an initial term of 10 years, beginning on the rent commencement date, with an option to extend the lease for an additional period of five years. We did not have to pay rent until the rent commencement date of January 1, 2018 and rent was reduced by 50% for the first six months. The lease contains scheduled rent increases over the lease term. We recognize the related rent expense for the lease on a straight-line basis over the term of the lease with the difference between the rent paid and the straight-line rent expense recorded as deferred rent. As of December 31, 2018 and 2017, deferred rent totaled $7.6 million and $5.4 million, respectively.

We received lease incentives totaling $14.4 million recorded as deferred rent from our landlord for a portion of the costs of leasehold improvements we made to the premises. We amortize the incentives on a straight-line basis over the term of the lease as a reduction of rent expense. As of December 31, 2018 and 2017, the unamortized leasehold improvement incentive totaled $12.2 million and $13.6 million, respectively. In addition, the lease required us to deliver an irrevocable standby letter of credit in an amount of $1.5 million to the landlord for the period commencing on the effective date of the agreement until at least 60 days after the expiration of the lease, subject to 50% reduction on January 1, 2023 if certain conditions are met.

In July 2018, we entered into a lease agreement for the installation, operational qualifications and performance qualifications of four sequencing instruments to support our bemarituzumab program. The agreement has two 3-year terms based on delivery dates for the first three instruments in July 2018 and the fourth instrument in January 2019. The lease contains consistent rent payments over the terms of the lease. We recognize the related rent expense for the delivered instruments on a straight-line basis over the term of the lease.

Rent expense for the years ended December 31, 2018, 2017 and 2016 was $5.9 million, $6.9 million, and $2.3million, respectively. The estimated future minimum commitments under our non-cancelable operating leases are as follows (in thousands):

Year ending December 31:	
2019	7,315
2020	7,564
2021	7,705
2022	7,787
2023	8,064
2024 and on	35,166
Total estimated minimum payments	$ 73,601

Indemnifications

As permitted under Delaware law and in accordance with our bylaws, we have agreed to indemnify our officers and directors for certain events or occurrences, subject to certain limits, while the officer or director is or was serving at our request in such capacity. The term of the indemnification period is equal to the officer's or director's lifetime.

The maximum amount of potential future indemnification is unlimited; however, we currently hold director and officer liability insurance. This insurance limits our exposure and may enable us to recover a portion of any future amounts paid. We believe that the fair value of these indemnification obligations is minimal. Accordingly, we have not recognized any liabilities relating to these obligations for any period presented.

We have certain agreements with service providers and other parties with which we do business that contain indemnification provisions pursuant to which we have agreed to indemnify the party against certain types of third-party claims. We accrue for known indemnification issues when a loss is probable and can be reasonably estimated. We would also accrue for estimated incurred but unidentified indemnification issues based on historical activity. As we have not incurred any indemnification losses to date, there were no accruals for or expenses related to indemnification issues for any period presented.

12. Subsequent Events

In January 2019, we implemented a corporate restructuring, or the restructuring, to focus our resources on our clinical development and late-stage research programs. Pursuant to the restructuring, we eliminated 41 employee positions, representing approximately 20% of our then-current headcount, primarily in areas relating to research, pathology and manufacturing.

We estimate approximately $2.0 million of pre-tax charges for severance and other costs related to the restructuring, primarily during the first quarter of 2019.

13. Selected Quarterly Financial Information (Unaudited)

The following amounts are in thousands, except per share amounts:

	Quarter Ended			
Quarterly Results of Operations	**March 31, 2018**	**June 30, 2018**	**September 30, 2018**	**December 31, 2018**
	(Unaudited)			
Revenue	$ 32,486	$ 7,580	$ 5,771	$ 4,031
Net loss	(20,390)	(34,060)	(47,244)	(38,753)
Basic and diluted net loss per share	(0.63)	(0.99)	(1.37)	(1.12)

	Quarter Ended			
Quarterly Results of Operations	**March 31, 2017**	**June 30, 2017**	**September 30, 2017**	**December 31, 2017**
	(Unaudited)			
Revenue	$ 10,135	$ 7,822	$ 8,333	$ 13,218
Net loss	(33,443)	(44,286)	(43,282)	(29,211)
Basic and diluted net loss per share	(1.21)	(1.58)	(1.54)	(1.04)

Basic and diluted net loss per share is computed independently for each of the quarters presented. Therefore, the sum of quarterly basic and diluted per share amounts may not equal annual basic and diluted net loss per share amounts.

Exhibit 10.14

July 24, 2017

Bryan Irving, Ph.D.
108 Ware Road
Woodside, CA 94062

Dear Bryan,

We are pleased to extend to you an offer of employment with Five Prime Therapeutics, Inc. as Senior Vice President, Research, reporting directly to me.

We would like for your full-time employment with FivePrime to begin at your earliest convenience, but no later than Tuesday, September 5, 2017.

We would pay you a base salary of $345,000, paid semi-monthly less applicable taxes and withholding. Once you begin full-time employment, you would be eligible to participate in FivePrime's benefit plans and programs available to all regular, full-time employees. These benefits currently include medical, vision, dental, disability, 401(k) investment plan, Employee Stock Purchase Plan, Section 125 (flex spending), Section 132 (mass transit) and paid time-off programs.

You would be eligible to participate in FivePrime's annual cash bonus program and your annual target bonus amount would be 35% of your annual base salary. Your bonus for 2017 will be pro-rated based on your start date. We would determine your actual annual performance bonus based on an assessment of your meeting individual goals (40% weighting) as well as FivePrime's attainment of corporate goals (60% weighting). Corporate achievement is determined by FivePrime's Board of Directors.

As an officer of FivePrime, we would enter into our Executive Severance Benefits Agreement with you, which would provide certain severance and change in control benefits to you.

Subject to approval by FivePrime's Board of Directors, we would grant you a stock option to purchase 80,000 shares of common stock of FivePrime. The exercise price per share would be the fair market value of common stock at the closing price on the date of grant. We would issue your stock option award under our 2013 Omnibus Incentive Plan. Your stock option award would be subject to a Stock Option Agreement, and the Executive Severance and Benefits Agreement. Subject to your continued employment with FivePrime and the other terms and conditions of your stock option grant, your stock option award would vest over four years, with 25% of the shares vesting on the first anniversary of your start date and the balance vesting in equal monthly installments over the subsequent 36 months.

In addition, subject to approval by FivePrime 's Board of Directors, we would grant you 15,000 shares of restricted common stock after your start date under our 2013 Omnibus Incentive Plan. Your restricted stock award would be subject to a Restricted Stock Agreement. Subject to your continued employment with FivePrime and the other terms and conditions of your restricted stock award, your restricted stock award would vest over a three-year period after the grant date in equal annual installments.

As a condition of our offer of employment, we require you to sign and comply with our Confidential Information and Innovation Assignment Agreement, which among other things prohibits unauthorized use or disclosure of FivePrime's confidential information. During your tenure with FivePrime, we would expect you to also abide by FivePrime's policies and procedures. Federal law requires us to verify your identity and eligibility for employment in the United States. Accordingly, our offer of employment is also conditioned upon this verification.

Our offer to you is subject to an acceptable background check. We use a third party resource (AccurateNow) for this background check and they will contact you by email to initiate this process.

Your employment with FivePrime would not be for a set term and you would be an at-will employee. You would be free to terminate your employment with FivePrime at any time and for any reason whatsoever simply by notifying us. Likewise, we would be free to terminate your employment at any time for any reason whatsoever, with or without cause or advance notice. This at-will employment relationship cannot be changed except in writing and signed by FivePrime's Chief Executive Officer.

This letter, along with the Confidential Information and Innovation Assignment Agreement, supersedes any prior representations or agreements, whether written or oral, with respect to our offer of employment to you. This letter may not be modified or amended except by a written agreement, signed by FivePrime and you.

To accept this offer of employment, please sign, date and return this letter and the Confidential Information and Innovation Assignment Agreement by the end of the business day on Friday, July 28, 2017. Please either fax the document to (415) 520-9842, attention Jeff Coon, or email a scanned copy to eFax-HR@ fiveprime.com.
Again, Bryan, I am very pleased to make this offer to you. We all believe you bring a great deal to FivePrime at this stage of our development and that your contributions would be important in continuing our progress. We all look forward to having you join our team as we continue to build a vibrant and successful company.

Sincerely,

/s/ Lewis T. “Rusty” Williams, M.D., Ph.D.
Lewis T. “Rusty” Williams, M.D., Ph.D.
Founder, President and Chief Executive Officer

Accepted:

/s/ Bryan Irving, Ph.D. 7/27/17
Bryan Irving, Ph.D. Date

September 5, 2017
Anticipated Start Date

Exhibit 10.15

October 24, 2018

David V. Smith
534 Justin Morgan Drive
Alamo, California 94507

Dear David,

We are pleased to extend to you an offer of employment with Five Prime Therapeutics, Inc. ("FivePrime") as Executive Vice President and Chief Financial Officer, reporting directly to me.

We would like for your full-time employment with FivePrime to begin at your earliest convenience, but no later than Monday, November 26, 2018.

Once you begin full-time employment, we will pay you an annual base salary of $430,000, paid semi-monthly less applicable taxes and withholding. You will be eligible to participate in FivePrime's benefit plans and programs available to all regular, full-time employees. These benefits currently include medical, vision, dental, disability, 401(k) investment plan, Employee Stock Purchase Plan, Section 125 (flex spending), Section 132 (mass transit) and paid time-off programs.

We currently have a process to evaluate performance and employee compensation on an annual basis and administer an annual bonus and equity incentive program in connection with this evaluation. This evaluation usually concludes in February or March of each year. Based on your anticipated start date, you will be eligible to participate in the annual discretionary compensation program beginning January 1, 2019. Your initial annual target bonus under our Annual Bonus Plan, which governs our annual cash bonus program, will be 40% of your annual base salary.

Subject to approval by the Compensation and Management Development Committee of the Board of Directors of FivePrime (the "Compensation Committee"), we will grant you a stock option to purchase 185,000 shares of common stock of FivePrime on or promptly after your start date. The exercise price per share will be the fair market value of common stock on the date of grant. We will issue your stock option award under our 2013 Omnibus Incentive Plan (the "2013 Plan"). Your stock option award will be subject to a Stock Option Agreement, and our Executive Severance Benefits Agreement (the "ESBA"). Subject to your continued employment with FivePrime and the other terms and conditions of your stock option grant, your stock option award will vest over four years, with 25% of the shares vesting on the first anniversary of your start date and the balance vesting in equal monthly installments over the subsequent 36 months.

In addition, subject to approval by the Compensation Committee, we will grant you 40,000 shares of restricted common stock under the 2013 Plan on or promptly after your start date. Your restricted stock award will be subject to a Restricted Stock Agreement and the ESBA. Subject to your continued employment with FivePrime and the other terms and conditions of your restricted stock award, your restricted stock award will vest over a three-year period after the grant date in equal annual installments.

We will enter into the ESBA and our Indemnity Agreement with you on the same terms as offered to other executive officers of FivePrime at the Executive Vice President level.

As a condition of our offer of employment, we require you to sign and comply with our Confidential Information and Innovation Assignment Agreement, which among other things prohibits unauthorized use or disclosure of FivePrime's confidential information. During your tenure with FivePrime, we will expect you to also abide by FivePrime's policies and procedures. Federal law requires us to verify your identity and eligibility for employment in the United States. Accordingly, our offer of employment is also conditioned upon this verification.

Our offer to you is conditioned on a check of your background and credit that we find acceptable. We use a third-party resource (AccurateNow) for this background and credit check and they will contact you by email after you execute and deliver this offer letter to us to initiate this process.

Your employment with FivePrime will not be for a set term and you will be an at-will employee.
You will be free to terminate your employment with FivePrime at any time and for any reason whatsoever simply by notifying us. Likewise, we will be free to terminate your employment at any time for any reason whatsoever, with or without cause or advance notice. This at-will employment relationship cannot be changed except in writing and signed by FivePrime's Chief Executive Officer.

This letter, along with the Confidential Information and Innovation Assignment Agreement, supersedes any prior representations or agreements, whether written or oral, with respect to our offer of employment to you. This letter may not be modified or amended except by a written agreement, signed by FivePrime and you.

To accept this offer of employment, please sign, date and send a scanned copy of this letter and the Confidential Information and Innovation Assignment Agreement by the end of the business day on Friday, October 26, 2018 to eFax-HR@fiveprime.com.

Again, David, I am very pleased to make this offer to you. We all believe you bring a great deal to FivePrime at this stage of our development and that your contributions will be important in continuing our progress. We all look forward to having you join our team as we continue to build a vibrant and successful company.

Sincerely,

Five Prime Therapeutics, Inc.

/s/ Aron Knickerbocker

Aron Knickerbocker
President and Chief Executive Officer

Accepted:

/s/ David V. Smith
David V. Smith

Date: October 24, 2018

Exhibit 10.26

Executive Severance Benefits Agreement

This Executive Severance Benefits Agreement (this "Agreement"), effective as of September 5, 2017 (the "Effective Date"), is between Bryan Irving, Ph.D. ("Executive") and Five Prime Therapeutics, Inc. ("FivePrime"). This Agreement is intended to provide Executive with certain compensation and benefits in the event that Executive is subject to certain qualifying terminations of employment. Certain capitalized terms used in this Agreement are defined in Article 6.

FivePrime and Executive hereby agree as follows:

ARTICLE 1

Scope of and Consideration for this Agreement

1.1 FivePrime desires to employ Executive in the position of Senior Vice President, Research, and Executive wishes to be employed by FivePrime in such position.

1.2 FivePrime and Executive wish to set forth the compensation and benefits that Executive shall be entitled to receive upon a Change in Control Termination or a Covered Termination.

1.3 The duties and obligations of FivePrime to Executive under this Agreement shall be in consideration for Executive's employment with FivePrime (and if Executive is a continuing employee, his or her past services to FivePrime), and, with respect to the benefits described in Article 2 and Article 3, Executive's compliance with the limitations and conditions on benefits as described in Article 4, including the execution of an effective Release, return of Company property and continued compliance with this Agreement.

1.4 This Agreement shall supersede any other policy, plan, program or arrangement, including any contract between Executive and any entity, relating to severance benefits payable by FivePrime to Executive in connection with a Change in Control Termination or Covered Termination.

ARTICLE 2

Change in Control Severance Benefits

2.1 **Severance Benefits.** Upon a Change in Control Termination, and subject to the limitations and conditions set forth in this Agreement, Executive shall be eligible to receive the benefits set forth in this Article 2.

2.2 **Salary Continuance.** Executive shall receive, as severance, an amount equal to Executive's Base Salary and Pro-Rata Bonus for that number of months in the Change in Control Severance Period, payable over such number of months immediately following the Termination Date in accordance with FivePrime's payroll schedule then in effect. Except as set forth in Article 4, the payments provided for in this Section 2.2 shall commence with the first regularly scheduled payroll pay date following the Termination Date.

2.3 **Health Continuation Coverage**.

(a) Provided that Executive is eligible and has made the necessary elections for continuation coverage pursuant to COBRA under a health, dental, or vision plan sponsored by FivePrime, FivePrime shall pay the applicable premiums (inclusive of premiums for Executive's dependents for such health, dental, or vision plan coverage as in effect immediately prior to the date of the Change in Control Termination) for such continued health, dental, or vision plan coverage following the date of the Change in Control Termination for up to the number of months equal to the Change in Control Severance Period (but in no event after such time as Executive is eligible for coverage under a health, dental or vision insurance plan of a subsequent employer or as Executive and Executive's dependents are no longer eligible for COBRA coverage). Such coverage shall be counted as coverage pursuant to COBRA. FivePrime shall have no obligation in respect of any premium payments (or any other payments in respect of health, dental, or vision coverage from FivePrime) following the effective date of the Executive's coverage by a health, dental, or vision insurance plan of a subsequent employer. Executive shall be required to notify FivePrime immediately if Executive becomes covered by a health, dental, or vision insurance plan of a subsequent employer. If Executive and Executive's dependents continue coverage pursuant to COBRA following the conclusion of the Change in Control Severance Period, Executive will be responsible for the entire payment of such premiums required under COBRA for the duration of the COBRA period.

(b) For purposes of this Section 2.3, (i) references to COBRA shall be deemed to refer also to analogous provisions of state law, and (ii) any applicable insurance premiums that are paid by FivePrime shall not include any amounts payable by Executive under a Code Section 125 health care reimbursement plan, which amounts, if any, are the sole responsibility of Executive.

2.4 **Stock Awards.** Upon a Change in Control Termination, (i) the vesting and exercisability of all outstanding options to purchase common stock of FivePrime (or stock appreciation rights or other rights with respect to stock of FivePrime issued pursuant to any equity incentive plan of FivePrime) issued by FivePrime and held by Executive on the Termination Date shall accelerate in full, and (ii) any reacquisition or repurchase rights held by FivePrime with respect to common stock issued or issuable (or with respect to other rights with respect to common stock of FivePrime issued or issuable) pursuant to any other stock award granted to Executive pursuant to any equity incentive plan of FivePrime shall lapse.

ARTICLE 3

Covered Termination Severance Benefits

3.1 **Severance Benefits.** Upon a Covered Termination, and subject to the limitations and conditions set forth in this Agreement, Executive shall be eligible to receive the benefits set forth in this Article 3.

3.2 **Salary Continuance.** Executive shall receive, as severance, an amount equal to Executive's Base Salary and Pro-Rata Bonus for that number of months in the Covered Termination Severance Period, payable over such number of months immediately following the Termination Date in accordance with FivePrime's payroll schedule then in effect. Except as set forth in Article 4, the payments provided for in this Section 3.2 shall commence with the first regularly scheduled payroll pay date following the Termination Date.

3.3 **Health Continuation Coverage**.

(a) Provided that Executive is eligible and has made the necessary elections for continuation coverage pursuant to COBRA under a health, dental, or vision plan sponsored by FivePrime, FivePrime shall pay for the applicable premiums (inclusive of premiums for Executive's dependents for such health, dental, or vision plan coverage as in effect immediately prior to the date of the Covered Termination) for such continued health, dental, or vision plan coverage following the date of the Covered Termination for up to the number of months equal to the Covered Termination Severance Period (but in no event after such time as Executive is eligible for coverage under a health, dental or vision insurance plan of a subsequent employer or as Executive and Executive's dependents are no longer eligible for COBRA coverage). Such coverage shall be counted as coverage pursuant to COBRA. FivePrime shall have no obligation in respect of any premium payments (or any other payments in respect of health, dental, or vision coverage from FivePrime) following the effective date of the Executive's coverage by a health, dental, or vision insurance plan of a subsequent employer. Executive shall be required to notify FivePrime immediately if Executive becomes covered by a health, dental, or vision insurance plan of a subsequent employer. If Executive and Executive's dependents continue coverage pursuant to COBRA following the conclusion of the Covered Termination Severance Period, Executive will be responsible for the entire payment of such premiums required under COBRA for the duration of the COBRA period.

(b) For purposes of this Section 3.3, (i) references to COBRA shall be deemed to refer also to analogous provisions of state law, and (ii) any applicable insurance premiums that are paid by FivePrime shall not include any amounts payable by Executive under a Code Section 125 health care reimbursement plan, which amounts, if any, are the sole responsibility of Executive.

3.4 **Stock Awards.** Upon a Covered Termination, (i) the vesting and exercisability of fifty percent (50%) of all unvested shares subject to outstanding options to purchase common stock of FivePrime (or stock appreciation rights or other rights with respect to stock of FivePrime issued pursuant to any equity incentive plan of FivePrime) issued by FivePrime and held by Executive on the Termination Date shall accelerate, and (ii) any reacquisition or repurchase rights held by FivePrime with respect to common stock of FivePrime issued or issuable (or with respect to other rights with respect to stock of FivePrime issued or issuable) pursuant to any other stock award granted to Executive pursuant to any equity incentive plan of FivePrime shall lapse with respect to fifty percent (50%) of those shares then unvested as of the Termination Date.

ARTICLE 4

Limitations and Conditions on Benefits

4.1 **Rights Conditioned on Compliance.** Executive's rights to receive all severance benefits described in Article 2 and Article 3 shall be conditioned upon and subject to Executive's compliance with the limitations and conditions on benefits as described in this Article 4.

4.2 **Continuation of Service Until Date of Termination.** Executive shall continue to provide service to FivePrime in good faith until the Termination Date, unless such performance is otherwise excused in writing by FivePrime.

4.3 **Release Prior to Payment of Benefits.** Upon the occurrence of a Change in Control Termination or a Covered Termination, as applicable, and prior to the provision or payment of any benefits under this Agreement on account of such Change in Control Termination or Covered Termination, as applicable, Executive must execute a general waiver and release in substantially the form attached hereto and incorporated herein as **Exhibit A**, or **Exhibit B**, as appropriate (each a "Release"), and such release must become effective in accordance with its terms, but in no event later than 60 days following the Termination Date. No amount shall be paid prior to such date. Instead, on the 60th day following the Termination Date, FivePrime will pay Executive the severance amount that Executive would otherwise have received on or prior to such date but for the delay in payment related to the effectiveness of the Release, with the balance of the severance amount being paid as originally scheduled. FivePrime may modify the Release in its discretion to comply with changes in applicable law at any time prior to Executive's execution of such Release. Such Release shall specifically relate to all of Executive's rights and claims in existence at the time of such execution and shall confirm Executive's obligations under Executive's Proprietary Information and

Inventions Agreement (or any successor agreement thereto) and any similar obligations under applicable law. It is understood that, as specified in the applicable Release, Executive has a certain number of calendar days to consider whether to execute such Release. If Executive does not execute such Release within the applicable period, no benefits shall be provided or payable under, and Executive shall have no further rights, title or interests in or to any severance benefits or payments pursuant to, this Agreement. It is further understood that in connection with a Change in Control Termination or a Covered Termination, as applicable, Executive may revoke the applicable Release within seven calendar days after its execution by Executive. If Executive revokes such Release within such subsequent seven-day period, no benefits shall be provided or payable under this Agreement pursuant to such Change in Control Termination or Covered Termination, as applicable.

4.4 **Return of Company Property.** Not later than the Termination Date, Executive shall return to FivePrime all documents (and all copies thereof) and other property belonging to FivePrime that Executive has in his or her possession or control. The documents and property to be returned include, but are not limited to, all files, correspondence, email, memoranda, notes, notebooks, records, plans, forecasts, reports, studies, analyses, compilations of data, proposals, agreements, financial information, research and development information, marketing information, operational and personnel information, databases, computer-recorded information, tangible property and equipment (including computers, facsimile machines, mobile telephones, and servers), credit cards, entry cards, identification badges and keys; and any materials of any kind that contain or embody any proprietary or confidential information of FivePrime (and all reproductions thereof in whole or in part). Executive agrees to make a diligent search to locate any such documents, property and information. If Executive has used any personally owned computer, server, or e-mail system to receive, store, review, prepare or transmit any Company confidential or proprietary data, materials or information, then within 10 business days after the Termination Date, Executive shall provide FivePrime with a computer-useable copy of all such information and then permanently delete and expunge such confidential or proprietary information from those systems. Executive agrees to provide FivePrime access to Executive's system as requested to verify that the necessary copying or deletion is done.

4.5 Cooperation and Continued Compliance.

(a) From and after the Termination Date, Executive shall cooperate fully with FivePrime in connection with its actual or contemplated defense, prosecution, or investigation of any existing or future litigation, arbitrations, mediations, claims, demands, audits, government or regulatory inquiries, or other matters arising from events, acts, or failures to act that occurred during the time period in which Executive was employed by FivePrime (including any period of employment with an entity acquired by FivePrime). Such cooperation includes being available upon reasonable notice, without subpoena, to provide accurate and complete advice, assistance and information to FivePrime, including offering and explaining evidence, providing truthful and accurate sworn statements, and participating in discovery and trial preparation and testimony. Executive also agrees to promptly send FivePrime copies of all correspondence (for example subpoenas) received by Executive in connection with any such legal proceedings, unless Executive is expressly prohibited by law from so doing. FivePrime will reimburse Executive for reasonable out-of-pocket expenses incurred in connection with any such cooperation (excluding foregone wages, salary, or other compensation) within 30 days of Executive's timely presentation of appropriate documentation thereof, in accordance with FivePrime's standard reimbursement policies and procedures, and will make reasonable efforts to accommodate Executive's scheduling needs. To the extent that any taxable reimbursements of expenses are provided hereunder, they shall be made or provided in accordance with Section 409A of the Code, including the following provisions: (i) the amount of any such expense reimbursement provided during Executive's taxable year shall not affect any expenses eligible for reimbursement in any other taxable year; (ii) the reimbursement of the eligible expense shall be made no later than the last day of Executive's taxable year that immediately follows the taxable year in which the expense was incurred; and (iii) the right to any reimbursement shall not be subject to liquidation or exchange for another benefit or payment.

(b) From and after the Termination Date, Executive shall continue to abide by all of the terms and provisions of the Confidential Information and Innovation Assignment Agreement between FivePrime and Executive (and any other comparable agreement signed by Executive), in accordance with its terms.

(c) Executive acknowledges and agrees that Executive's obligations under this Section 4.5 are an essential part of the consideration Executive is providing hereunder in exchange for which and in reliance upon which FivePrime has agreed to provide the payments and benefits under this Agreement. Executive further acknowledges and agrees that Executive's violation of Section 4.5 inevitably would involve use or disclosure of FivePrime's proprietary and confidential information. Accordingly, Executive agrees that Executive will forfeit, effective as of the date of any breach, any right, entitlement, claim or interest in or to any unpaid portion of the severance payments or benefits provided in Article 2 or Article 3.

4.6 Parachute Payments.

(a) **Parachute Payment Limitation**. If any payment or benefit (including payments and benefits pursuant to this Agreement) Executive would receive in connection with a Change in Control from FivePrime or otherwise ("Payment") would
(i) constitute a "parachute payment" within the meaning of Section 280G of the Code, and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "Excise Tax"), then FivePrime shall cause to be determined, before any amounts of the Payment are paid to Executive, which of the following two alternative forms of payment shall be paid to Executive: (i) payment in full of the entire amount of the Payment (a "Full Payment"), or (ii) payment of only a part of the Payment so that Executive receives the largest payment possible without the imposition of the Excise Tax (a "Reduced Payment"). A Full Payment shall be made in the event that the quotient obtained by dividing (i) the excess of (a) the Full Payment, over (b) the Reduced Payment, by (ii) the Reduced Payment, is greater than ten percent (10%). A Reduced Payment shall be made in the event that the quotient obtained by dividing (i) the excess of (a) the Full Payment, over (b) the Reduced Payment, by (ii) the Reduced Payment, is less than or equal to ten percent (10%). If a Reduced Payment is made, (i) the Payment shall be paid only to the extent permitted under the Reduced Payment alternative, and Executive shall have no rights to any additional payments or benefits constituting the Payment, and (ii) reduction in payments or benefits shall occur in the following order: (1) reduction of cash payments; (2) cancellation of accelerated vesting of equity awards other than stock options; (3) cancellation of accelerated vesting of stock options; and (4) reduction of other benefits paid to Executive. In the event that acceleration of compensation from Executive's equity awards is to be reduced, such acceleration of vesting shall be canceled in the reverse order of the date of grant.

(b) The independent registered public accounting firm engaged by FivePrime for general audit purposes as of the day prior to the effective date of the Change in Control shall make all determinations required to be made under this Section
4.6. If the independent registered public accounting firm so engaged by FivePrime is serving as accountant or auditor for the individual, entity or group effecting the Change in Control, FivePrime shall appoint a nationally recognized independent registered public accounting firm to make the determinations required hereunder. FivePrime shall bear all expenses with respect to the determinations by such independent registered public accounting firm required to be made hereunder.

(c) The independent registered public accounting firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to FivePrime and Executive within 15 calendar days after the date on which Executive's right to a Payment is triggered (if requested at that time by FivePrime or Executive) or such other time as requested by FivePrime or Executive. If the independent registered public accounting firm determines that no Excise Tax is payable with respect to a Payment, either before or after the application of the Reduced Amount, it shall furnish FivePrime and Executive with an opinion reasonably acceptable to Executive

that no Excise Tax will be imposed with respect to such Payment. Any good faith determinations of the accounting firm made hereunder shall be final, binding and conclusive upon FivePrime and Executive.

4.7 Certain Reductions and Offsets. To the extent that any federal, state or local laws, including the Worker Adjustment and Retraining Notification Act (the "WARN Act") or any other so-called "plant closing" laws, require FivePrime to give advance notice or make a payment of any kind to Executive because of Executive's involuntary

termination due to a layoff, reduction in force, plant or facility closing, sale of business, change in control, or any other similar event or reason, the benefits payable under this Agreement shall be correspondingly reduced. The benefits provided under this Agreement are intended to satisfy any and all statutory obligations that may arise out of Executive's involuntary termination of employment for the foregoing reasons, and the parties shall construe and enforce the terms of this Agreement accordingly.

4.8 **Mitigation.** Except as otherwise specifically provided herein, Executive shall not be required to mitigate damages or the amount of any payment provided under this Agreement by seeking other employment or otherwise, nor shall the amount of any payment provided for under this Agreement be reduced by any compensation earned by Executive as a result of employment by another employer or by any retirement benefits received by Executive after the date of a Change in Control Termination or Covered Termination (except as expressly provided in Sections 2.3 and 3.3 above).

4.9 **Indebtedness of Executive**. If Executive is indebted to FivePrime on the effective date of a Change in Control Termination or Covered Termination, FivePrime reserves the right to offset any severance payments and benefits under this Agreement by the amount of such indebtedness.

4.10 **Application of Section 409A**. It is intended that each installment of the payments provided for in this Agreement is a separate "payment" for purposes of Treasury Regulation Section 1.409A-2(b)(2)(i). For the avoidance of doubt, it is intended that the payments under this Agreement satisfy, to the greatest extent possible, the exemptions from the application of Code Section 409A provided under Treasury Regulation Sections 1.409A-1(b)(4), 1.409A-1(b)(5) and 1.409A-1(b)(9). However, if FivePrime (or, if applicable, the successor entity thereto) determines that the severance payments provided under this agreement (the "Agreement Payments") constitute "deferred compensation" under Section 409A and Executive is, on the termination of service, a "specified employee" of FivePrime or any successor entity thereto, as such term is defined in Section 409A(a)(2)(B)(i) of the Code, then, solely to the extent necessary to avoid the incurrence of the adverse personal tax consequences under Code Section 409A, the timing of the Agreement Payments shall be delayed as follows: on the earlier to occur of (i) the date that is six months and one day after Executive's separation from service or (ii) the date of Executive's death (such earlier date, the "Delayed Initial Payment Date"), FivePrime (or the successor entity thereto, as applicable) shall (A) pay Executive a lump sum amount equal to the sum of the Agreement Payments that she would otherwise have received through the Delayed Initial Payment Date if the commencement of the payment of the Agreement Payments had not been so delayed pursuant to this paragraph and (B) commence paying the balance of the Agreement Payments in accordance with the applicable payment schedules set forth in this agreement.

4.11 **Tax Withholding**. All payments under this Agreement shall be subject to applicable withholding for federal, state and local income and employment taxes.

ARTICLE 5

Other Rights and Benefits

Nothing in this Agreement shall prevent or limit Executive's continuing or future participation in any benefit, bonus, incentive or other plans, programs, policies or practices provided by FivePrime and for which Executive may otherwise qualify, nor shall anything herein limit or otherwise affect such rights as Executive may have under other agreements with FivePrime except as provided in Section 1.4 above. Except as otherwise expressly provided herein, amounts that are vested benefits or that Executive is otherwise entitled to receive under any plan, policy, practice or program of FivePrime at or subsequent to the date of a Change in Control shall be payable in accordance with such plan, policy, practice or program.

ARTICLE 6

Definitions

Unless otherwise provided, for purposes of this Agreement, the following definitions shall apply:

6.1 "Base Salary" means 1/12th of the greater of (i) Executive's annual base salary (excluding incentive pay, premium pay, commissions, overtime, bonuses, and other forms of variable compensation) as in effect immediately prior to a Change in Control Termination or a Covered Termination, as applicable, or (ii) in the case of a Change in Control Termination, Executive's annual base salary (excluding incentive pay, premium pay, commissions, overtime, bonuses, and other forms of variable compensation) as in effect immediately prior to a Change in Control.

6.2 "Board" means the Board of Directors of FivePrime.

6.3 "Cause" means Executive's: (i) dishonest statements or acts with respect to FivePrime, any subsidiary or any affiliate of FivePrime or any subsidiary; (ii) commission by or indictment for (A) a felony or (B) any misdemeanor (excluding minor traffic violations) involving moral turpitude, deceit, dishonesty or fraud ("indictment," for these purposes, meaning an indictment, probable cause hearing or any other procedure pursuant to which an initial determination of probable or reasonable cause with respect to such offense is made); (iii) gross negligence, willful misconduct or insubordination with respect to FivePrime, any subsidiary or any affiliate of FivePrime or any subsidiary;
(iv) material breach of any of Executive's obligations under any agreement to which Executive and FivePrime or any subsidiary are a party; or (v) death or disability. With respect to item (iv), Executive will be given notice and a 30-day period in which to cure

such breach, only to the extent such breach can be reasonably expected to be able to be cured within such period. Executive agrees that the breach of any non-solicitation or confidentiality obligation to FivePrime or any subsidiary shall not be curable to any extent.

6.4 "Change in Control" means the occurrence, in a single transaction or in a series of related transactions, of any one or more of the following events:

(a) Any natural person, entity or group within the meaning of Section 13(d) or 14(d) of the Securities Exchange Act of 1934 ("Exchange Act Person") becomes the owner, directly or indirectly, of securities of FivePrime representing more than fifty percent (50%) of the combined voting power of FivePrime's then outstanding securities other than by virtue of a merger, consolidation or similar transaction. Notwithstanding the foregoing, a Change in Control shall not be deemed to occur (i) on account of the acquisition of securities of FivePrime by any institutional investor, any affiliate thereof or any other Exchange Act Person that acquires FivePrime's securities in a transaction or series of related transactions that are primarily a private financing transaction for FivePrime or (ii) solely because the level of ownership held by any Exchange Act Person (the "Subject Person") exceeds the designated percentage threshold of the outstanding voting securities as a result of a repurchase or other acquisition of voting securities by FivePrime reducing the number of shares outstanding, provided that if a Change in Control would occur (but for the operation of this sentence) as a result of the acquisition of voting securities by FivePrime, and after such share acquisition, the Subject Person becomes the Owner of any additional voting securities that, assuming the repurchase or other acquisition had not occurred, increases the percentage of the then outstanding voting securities owned by the Subject Person over the designated percentage threshold, then a Change in Control shall be deemed to occur;

(b) There is consummated a merger, consolidation or similar transaction involving (directly or indirectly) FivePrime if, immediately after the consummation of such merger, consolidation or similar transaction, the stockholders of FivePrime immediately prior thereto do not own, directly or indirectly, either (i) outstanding voting securities representing more than fifty percent (50%) of the combined outstanding voting power of the surviving entity in such merger, consolidation or similar transaction or (ii) more than fifty percent (50%) of the combined outstanding voting power of the parent of the surviving entity in such merger, consolidation or similar transaction;

(c) The stockholders of FivePrime approve or the Board approves a plan of complete dissolution or liquidation of FivePrime, or a complete dissolution or liquidation of FivePrime shall otherwise occur; or

(d) There is consummated a sale, lease, license or other disposition of all or substantially all of the consolidated assets of FivePrime and its subsidiaries, other than a sale, lease, license or other disposition of all or substantially all of the consolidated assets of FivePrime and its subsidiaries to an entity, more than fifty percent (50%) of the combined voting power of the voting securities of which are owned by stockholders of FivePrime in substantially the same proportion as their ownership of FivePrime immediately prior to such sale, lease, license or other disposition.

The term Change in Control shall not include a sale of assets, merger or other transaction effected exclusively for the purpose of changing the domicile of FivePrime. Notwithstanding the foregoing or any other provision of this Agreement, the definition of Change in Control (or any analogous term) in an individual written agreement between FivePrime or any affiliate and the participant shall supersede the foregoing definition with respect to stock awards subject to such agreement (it being understood, however, that if no definition of Change in Control or any analogous term is set forth in such an individual written agreement, the foregoing definition shall apply).

6.5 "Change in Control Severance Period" means the period of 18 months commencing on the Termination Date.

6.6 "Change in Control Termination" means an "Involuntary Termination Without Cause" or "Resignation for Good Reason," either of which occurs on, or within three months prior to, or within 12 months following, the effective date of a Change in Control, provided that any such termination is a "separation from service" within the meaning of Treasury Regulation Section 1.409A-1(h). Death and disability shall not be deemed Change in Control Terminations.

6.7 "COBRA" means the Consolidated Omnibus Budget Reconciliation Act of 1985, as amended.

6.8 "Code" means the Internal Revenue Code of 1986, as amended.

6.9 "Company" means Five Prime Therapeutics, Inc. or, following a Change in Control, the surviving entity resulting from such transaction, or any subsequent surviving entity resulting from any subsequent Change in Control.

6.10 "Covered Termination" means an "Involuntary Termination Without Cause", provided that any such termination is a "separation from service" within the meaning of Treasury Regulation Section 1.409A-1(h). Death, disability, and termination of employment by Executive, shall not be deemed Covered Terminations.

6.11 "Covered Termination Severance Period" means the period of nine months commencing on the Termination Date.

6.12 "Involuntary Termination Without Cause" means Executive's dismissal or discharge by FivePrime for reasons other than Cause and other than as a result of death or disability.

6.13 "Pro-Rata Bonus" means 1/12th of the greater of (i) the average annual bonus paid to Executive for the three years preceding the date of a Change in Control Termination or Covered Termination, as applicable, (or such lesser number of years during which Executive has been employed by FivePrime), or (ii) annual target cash bonus, as in effect immediately prior to a Change in Control Termination or Covered Termination, as applicable.

6.14 "Resignation for Good Reason" means Executive's resignation from all employee positions Executive then-holds with FivePrime within 60 days following any of the following events taken without Executive's consent, provided Executive has given FivePrime written notice of such event within 30 days after the first occurrence of such event and FivePrime has not cured such event within 30 days thereafter:

(a) A decrease in Executive's total target cash compensation (base and bonus) of more than 10% (i.e., a material reduction in Executive's base compensation and a material breach by FivePrime of Executive's employment terms with FivePrime), other than in connection with a comparable decrease in compensation for all comparable executives of FivePrime;

(b) Executive's duties or responsibilities are materially diminished (not simply a change in title or reporting relationships); Executive shall not be deemed to have a "Resignation for Good Reason" if FivePrime survives as a separate legal entity or business unit following the Change in Control and Executive holds materially the same position in such legal entity or business unit as Executive held before the Change in Control;

(c) An increase in Executive's round-trip driving distance of more than 50 miles from Executive's principal personal residence to the principal office or business location at which Executive is required to perform services (except for required business travel to the extent consistent with Executive's prior business travel obligations); or

(d) The failure of FivePrime to obtain a satisfactory agreement from any successor to materially assume and materially agree to perform under the terms of this Agreement.

6.15 "Termination Date" means the effective date of the Change in Control Termination or Covered Termination, as applicable.

ARTICLE 7

General Provisions

7.1 **Employment Status.** This Agreement does not constitute a contract of employment or impose upon Executive any obligation to remain as an employee, or impose on FivePrime any obligation (i) to retain Executive as an employee, (ii) to change the status of Executive as an at-will employee or (iii) to change FivePrime's policies regarding termination of employment.

7.2 **Notices.** Any notices provided hereunder must be in writing, and such notices or any other written communication shall be deemed effective upon the earlier of personal delivery (including personal delivery by facsimile) or the third day after mailing by first class mail, to FivePrime at its primary office location and to Executive at
Executive's address as listed in FivePrime's payroll records. Any payments made by FivePrime to Executive under the terms of this Agreement shall be delivered to Executive either in person or at the address as listed in FivePrime's payroll records.

7.3 **Severability.** Whenever possible, each provision of this Agreement will be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be invalid, illegal or unenforceable in any respect under any applicable law or rule in any jurisdiction, such invalidity, illegality or unenforceability will not affect any other provision or any other jurisdiction, but this Agreement will be reformed, construed and enforced in such jurisdiction as if such invalid, illegal or unenforceable provisions had never been contained herein.

7.4 **Waiver.** If either party should waive any breach of any provisions of this Agreement, he, she or it shall not thereby be deemed to have waived any preceding or succeeding breach of the same or any other provision of this Agreement.

7.5 **Arbitration.** Unless otherwise prohibited by law or specified below, all disputes, claims and causes of action, in law or equity, arising from or relating to this Agreement or its enforcement, performance, breach, or interpretation shall be resolved solely and exclusively by final and binding arbitration held in the San Francisco Bay Area through Judicial Arbitration & Mediation Services/Endispute ("JAMS") under the then existing JAMS employment law arbitration rules. However, nothing in this Section
7.5 is intended to prevent either party from obtaining injunctive relief in court to prevent irreparable harm pending the conclusion of any such arbitration. Each party in any such arbitration shall be responsible for its own attorneys' fees, costs and necessary disbursement; *provided, however,* that in the event one party refuses to arbitrate and the other party seeks to compel arbitration by court order, if such other party prevails, it shall be entitled to recover reasonable attorneys' fees, costs and necessary disbursements. Pursuant to California Civil Code Section 1717, each party warrants

that it was represented by counsel in the negotiation and execution of this Agreement, including the attorneys' fees provision herein.

7.6 **Complete Agreement.** This Agreement, including **Exhibit A** and **Exhibit B**, constitutes the entire agreement between Executive and FivePrime and is the complete, final, and exclusive embodiment of their agreement with regard to this subject matter, wholly superseding all written and oral agreements with respect to payments and benefits to Executive in the event of employment termination. It is entered into without reliance on any promise or representation other than those expressly contained herein.

7.7 **Amendment or Termination of Agreement; Continuation of Agreement.** This Agreement may be changed or terminated only upon the mutual written consent of FivePrime and Executive. The written consent of FivePrime to a change or termination of this Agreement must be signed by an executive officer of FivePrime (other than Executive) after such change or termination has been approved by the Board. Unless so terminated, this Agreement shall continue in effect for as long as Executive continues to be employed by FivePrime or by any surviving entity following any Change in Control. In other words, if, following a Change in Control, Executive continues to be employed by the surviving entity without a Change in Control Termination and the surviving entity then undergoes a Change in Control, following which Executive is terminated by the subsequent surviving entity in a Change in Control Termination, then Executive shall receive the benefits described in Article 2 hereof.

7.8 **Counterparts.** This Agreement may be executed in separate counterparts, any one of which need not contain signatures of more than one party, but all of which taken together will constitute one and the same Agreement.

7.9 **Headings.** The headings of the Articles and Sections hereof are inserted for convenience only and shall not be deemed to constitute a part hereof nor to affect the meaning thereof.

7.10 **Successors and Assigns.** This Agreement is intended to bind and inure to the benefit of and be enforceable by Executive, and FivePrime, and any surviving entity resulting from a Change in Control and upon any other person who is a successor by merger, acquisition, consolidation or otherwise to the business formerly carried on by FivePrime, and their respective successors, assigns, heirs, executors and administrators, without regard to whether or not such person actively assumes any rights or duties hereunder; *provided, however,* that Executive may not assign any duties hereunder and may not assign any rights hereunder without the written consent of FivePrime, which consent shall not be withheld unreasonably.

7.11 **ERISA.** This Agreement is intended to constitute a severance agreement subject to the Employee Retirement Income Security Act of 1974, as amended ("ERISA").

7.12 **Choice of Law.** To the extent not preempted by ERISA, all questions concerning the construction, validity and interpretation of this Agreement will be governed by the law of the State of California, without regard to such state's conflict of laws rules.

7.13 **Construction of Agreement.** In the event of a conflict between the text of this Agreement and any summary, description or other information regarding this Agreement, the text of this Agreement shall control.

7.14 Circular 230 Disclaimer. The following disclaimer is provided in accordance with the Internal Revenue Service's Circular 230 (21 C.F.R. Part 10). Any tax advice contained in this Agreement is intended to be preliminary, for discussion purposes only, and not final. Any such advice is not intended to be used for marketing, promoting or recommending any transaction or for the use of any person in connection with the preparation of any tax return. Accordingly, this advice is not intended or written to be used, and it cannot be used, by any person for the purpose of avoiding tax penalties that may be imposed on such person.

IN WITNESS WHEREOF, the parties have executed this Agreement on the Effective Date.

Five Prime Therapeutics, Inc.

: /s/ Lewis T. Williams
wis T. Williams
President and Chief Executive Officer

/s/ Bryan Irving, Ph.D.

Bryan Irving, Ph.D.

Exhibit A

RELEASE

(Individual Termination – Age 40 or Older)

Certain capitalized terms used in this Release are defined in the Executive Change in Control Severance Benefits Agreement (the "Agreement") which I have executed and of which this Release is a part.

I hereby confirm my obligations under FivePrime's Employee Confidentiality and Inventions Assignment Agreement (or other comparable agreement that I have signed, if any).

I acknowledge that I have read and understand Section 1542 of the California Civil Code which reads as follows: "**A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.**" I hereby expressly waive and relinquish all rights and benefits under that section and any law of any jurisdiction of similar effect with respect to my release of any claims provided herein.

Except as otherwise set forth in this Release, I hereby release, acquit and forever discharge FivePrime, its parents and subsidiaries, and their officers, directors, agents, servants, employees, shareholders, successors, assigns and affiliates, of and from any and all claims, liabilities, demands, causes of action, costs, expenses, attorneys fees, damages, indemnities and obligations of every kind and nature, in law, equity, or otherwise, known and unknown, suspected and unsuspected, disclosed and undisclosed (other than any claim for indemnification I may have as a result of any third party action against me based on my employment with FivePrime), arising out of or in any way related to agreements, events, acts or conduct at any time prior to the date I execute this Release, including all such claims and demands directly or indirectly arising out of or in any way connected with my employment with FivePrime or the termination of that employment, including claims of intentional and negligent infliction of emotional distress, any and all tort claims for personal injury, claims or demands related to salary, bonuses, commissions, stock, stock options, or any other ownership interests in FivePrime, vacation pay, fringe benefits, expense reimbursements, severance pay, or any other form of compensation; claims pursuant to any federal, state or local law or cause of action including the federal Civil Rights Act of 1964, as amended; the federal Age Discrimination in Employment Act of 1967, as amended ("ADEA"); the federal Employee Retirement Income Security Act of 1974, as amended; the federal Americans with Disabilities Act of 1990; the California Fair Employment and Housing Act, as amended; tort law; contract law; wrongful discharge; discrimination; fraud; defamation; emotional distress; and breach of the implied covenant of good faith and fair dealing; *provided, however,* that nothing in this paragraph shall be construed in any way to

release FivePrime from its obligation to indemnify me pursuant to FivePrime's indemnification obligation pursuant to written agreement or applicable law.

I acknowledge that I am knowingly and voluntarily waiving and releasing any rights I may have under ADEA. I also acknowledge that the consideration given under this Agreement for the waiver and release in the preceding paragraph hereof is in addition to anything of value to which I was already entitled. I further acknowledge that I have been advised by this writing, as required by the ADEA, that: (A) my waiver and release do not apply to any rights or claims that may arise on or after the date I execute this Release; (B) I have the right to consult with an attorney prior to executing this Release; (C) I have 21 days to consider this Release (although I may choose to voluntarily execute this Release earlier); (D) I have seven days following my execution of this Release to revoke the Release by providing a written notice of revocation to FivePrime's Chief Executive Officer; and (E) this Release shall not be effective until the date upon which the revocation period has expired, which shall be the eighth day after I execute this Release (provided that I do not revoke it).

I hereby represent that I have been paid all compensation owed and for all hours worked, I have received all the leave and leave benefits and protections for which I am eligible, pursuant to the federal Family and Medical Leave Act, the California Family Rights Act, any Company policy or applicable law, and I have not suffered any on-the- job injury or illness for which I have not already filed a workers' compensation claim.

Bryan Irving, Ph.D.

Date:

Exhibit B

RELEASE

(Group Termination – Age 40 or Older)

Certain capitalized terms used in this Release are defined in the Executive Change in Control Severance Benefits Agreement (the "Agreement") which I have executed and of which this Release is a part.

I hereby confirm my obligations under FivePrime's Employee Confidentiality and Inventions Assignment Agreement (or other comparable agreement that I have signed, if any).

I acknowledge that I have read and understand Section 1542 of the California Civil Code which reads as follows: "**A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.**" I hereby expressly waive and relinquish all rights and benefits under that section and any law of any jurisdiction of similar effect with respect to my release of any claims provided herein.

Except as otherwise set forth in this Release, I hereby release, acquit and forever discharge FivePrime, its parents and subsidiaries, and their officers, directors, agents, servants, employees, shareholders, successors, assigns and affiliates, of and from any and all claims, liabilities, demands, causes of action, costs, expenses, attorneys fees, damages, indemnities and obligations of every kind and nature, in law, equity, or otherwise, known and unknown, suspected and unsuspected, disclosed and undisclosed (other than any claim for indemnification I may have as a result of any third party action against me based on my employment with FivePrime), arising out of or in any way related to agreements, events, acts or conduct at any time prior to the date I execute this Release, including all such claims and demands directly or indirectly arising out of or in any way connected with my employment with FivePrime or the termination of that employment, including claims of intentional and negligent infliction of emotional distress, any and all tort claims for personal injury, claims or demands related to salary, bonuses, commissions, stock, stock options, or any other ownership interests in FivePrime, vacation pay, fringe benefits, expense reimbursements, severance pay, or any other form of compensation; claims pursuant to any federal, state or local law or cause of action including the federal Civil Rights Act of 1964, as amended; the federal Age Discrimination in Employment Act of 1967, as amended ("ADEA"); the federal Employee Retirement Income Security Act of 1974, as amended; the federal Americans with Disabilities Act of 1990; the California Fair Employment and Housing Act, as

amended; tort law; contract law; wrongful discharge; discrimination; fraud; defamation; emotional distress; and breach of the implied covenant of good faith and fair dealing; *provided, however,* that nothing in this paragraph shall be construed in any way to release FivePrime from its obligation to indemnify me pursuant to FivePrime's indemnification obligation pursuant to written agreement or applicable law.

I acknowledge that I am knowingly and voluntarily waiving and releasing any rights I may have under the ADEA. I also acknowledge that the consideration given under this Agreement for the waiver and release in the preceding paragraph hereof is in addition to anything of value to which I was already entitled. I further acknowledge that I have been advised by this writing, as required by the ADEA, that: (A) my waiver and release do not apply to any rights or claims that may arise on or after the date I execute this Release; (B) I have the right to consult with an attorney prior to executing this Release; (C) I have 45 days to consider this Release (although I may choose to voluntarily execute this Release earlier); (D) I have seven days following my execution of this Release to revoke the Release by providing a written notice of revocation to FivePrime's Chief Executive Officer; (E) this Release shall not be effective until the date upon which the revocation period has expired, which shall be the eighth day after I execute this Release; and (F) I have received with this Release the required written disclosure for a "group termination" under the ADEA, including a detailed list of the job titles and ages of all employees who were terminated in this group termination and the ages of all employees of FivePrime in the same job classification or organizational unit who were not terminated.

I hereby represent that I have been paid all compensation owed and for all hours worked, I have received all the leave and leave benefits and protections for which I am eligible, pursuant to the federal Family and Medical Leave Act, the California Family Rights Act, any Company policy or applicable law, and I have not suffered any on-the- job injury or illness for which I have not already filed a workers' compensation claim.

Bryan Irving, Ph.D.

Date:

Exhibit 10.27

Executive Severance Benefits Agreement

This Executive Severance Benefits Agreement (this "Agreement"), effective as of November 26, 2018 (the "Effective Date"), is between David Smith ("Executive") and Five Prime Therapeutics, Inc. ("FivePrime"). This Agreement is intended to provide Executive with certain compensation and benefits in the event that Executive is subject to certain qualifying terminations of employment. Certain capitalized terms used in this Agreement are defined in Article 6.

Background

A. FivePrime and Executive entered into an offer letter effective October 24, 2018 (the "Offer Letter") pursuant to which FivePrime offered to employ Executive in the position of Executive Vice President and Chief Financial Officer of FivePrime and Executive accepted such offer of employment.

B. Pursuant to the Offer Letter, FivePrime and Executive agreed to enter into this Agreement.

FivePrime and Executive hereby agree as follows:

ARTICLE 1

Scope of and Consideration for this Agreement

1.1 FivePrime and Executive wish to set forth the compensation and benefits that Executive shall be entitled to receive upon a Change in Control Termination or a Covered Termination.

1.2 The duties and obligations of FivePrime to Executive under this Agreement shall be in consideration for Executive's employment with FivePrime and, with respect to the benefits described in Article 2 and Article 3, Executive's compliance with the limitations and conditions on benefits as described in Article 4, including the execution of an effective Release, return of Company property and continued compliance with this Agreement.

1.3 This Agreement shall supersede any other policy, plan, program or arrangement, including any contract between Executive and any entity, relating to severance benefits payable by FivePrime to Executive in connection with a Change in Control Termination or Covered Termination.

ARTICLE 2

Change in Control Severance Benefits

2.1 Severance Benefits. Upon a Change in Control Termination, and subject to the limitations and conditions set forth in this Agreement, Executive shall be eligible to receive the benefits set forth in this Article 2.

2.2 Salary Continuance. Executive shall receive, as severance, an amount equal to Executive's Base Salary and Pro-Rata Bonus for that number of months in the Change in Control Severance Period, payable over such number of months immediately following the Termination Date in accordance with FivePrime's payroll schedule then in effect. Except as set forth in Article 4, the payments provided for in this Section 2.2 shall commence with the first regularly scheduled payroll pay date following the Termination Date.

2.3 Health Continuation Coverage.

(a) Provided that Executive is eligible and has made the necessary elections for continuation coverage pursuant to COBRA under a health, dental, or vision plan sponsored by FivePrime, FivePrime shall pay the applicable premiums (inclusive of premiums for Executive's dependents for such health, dental, or vision plan coverage as in effect immediately prior to the date of the Change in Control Termination) for such continued health, dental, or vision plan coverage following the date of the Change in Control Termination for up to the number of months equal to the Change in Control Severance Period (but in no event after such time as Executive is eligible for coverage under a health, dental or vision insurance plan of a subsequent employer or as Executive and Executive's dependents are no longer eligible for COBRA coverage). Such coverage shall be counted as coverage pursuant to COBRA. FivePrime shall have no obligation in respect of any premium payments (or any other payments in respect of health, dental, or vision coverage from FivePrime) following the effective date of the Executive's coverage by a health, dental, or vision insurance plan of a subsequent employer. Executive shall be required to notify FivePrime immediately if Executive becomes covered by a health, dental, or vision insurance plan of a subsequent employer. If Executive and Executive's dependents continue coverage pursuant to COBRA following the conclusion of the Change in Control Severance Period, Executive will be responsible for the entire payment of such premiums required under COBRA for the duration of the COBRA period.

(b) For purposes of this Section 2.3, (i) references to COBRA shall be deemed to refer also to analogous provisions of state law, and (ii) any applicable insurance premiums that are paid by FivePrime shall not include any amounts payable by Executive under a Code Section 125 health care reimbursement plan, which amounts, if any, are the sole responsibility of Executive.

2.4 Stock Awards. Upon a Change in Control Termination, (i) the vesting and exercisability of all outstanding options to purchase common stock of FivePrime (or stock appreciation rights or other rights with respect to stock of FivePrime issued pursuant to any equity incentive plan of FivePrime) issued by FivePrime and held by Executive on the Termination Date shall accelerate in full, and (ii) any reacquisition or repurchase rights held by FivePrime with respect to common stock issued or issuable (or with respect to other rights with respect to common stock of FivePrime issued or issuable) pursuant to any other stock award granted to Executive pursuant to any equity incentive plan of FivePrime shall lapse.

ARTICLE 3

Covered Termination Severance Benefits

3.1 Severance Benefits. Upon a Covered Termination, and subject to the limitations and conditions set forth in this Agreement, Executive shall be eligible to receive the benefits set forth in this Article 3.

3.2 Salary Continuance. Executive shall receive, as severance, an amount equal to Executive's Base Salary and Pro-Rata Bonus for that number of months in the Covered Termination Severance Period, payable over such number of months immediately following the Termination Date in accordance with FivePrime's payroll schedule then in effect. Except as set forth in Article 4, the payments provided for in this Section 3.2 shall commence with the first regularly scheduled payroll pay date following the Termination Date.

3.3 Health Continuation Coverage.

(a) Provided that Executive is eligible and has made the necessary elections for continuation coverage pursuant to COBRA under a health, dental, or vision plan sponsored by FivePrime, FivePrime shall pay for the applicable premiums (inclusive of premiums for Executive's dependents for such health, dental, or vision plan coverage as in effect immediately prior to the date of the Covered Termination) for such continued health, dental, or vision plan coverage following the date of the Covered Termination for up to the number of months equal to the Covered Termination Severance Period (but in no event after such time as Executive is eligible for coverage under a health, dental or vision insurance plan of a subsequent employer or as Executive and Executive's dependents are no longer eligible for COBRA coverage). Such coverage shall be counted as coverage pursuant to COBRA. FivePrime shall have no obligation in respect of any premium payments (or any other payments in respect of health, dental, or vision coverage from FivePrime) following the effective date of the Executive's coverage by a health, dental, or vision insurance plan of a subsequent employer. Executive shall be required to notify FivePrime immediately if Executive becomes covered by a health, dental, or vision insurance plan of a subsequent employer. If Executive and Executive's dependents continue coverage

pursuant to COBRA following the conclusion of the Covered Termination Severance Period, Executive will be responsible for the entire payment of such premiums required under COBRA for the duration of the COBRA period.

(b) For purposes of this Section 3.3, (i) references to COBRA shall be deemed to refer also to analogous provisions of state law, and (ii) any applicable insurance premiums that are paid by FivePrime shall not include any amounts payable by Executive under a Code Section 125 health care reimbursement plan, which amounts, if any, are the sole responsibility of Executive.

3.4 Stock Awards. Upon a Covered Termination, (i) the vesting and exercisability of fifty percent (50%) of all unvested shares subject to outstanding options to purchase common stock of FivePrime (or stock appreciation rights or other rights with respect to stock of FivePrime issued pursuant to any equity incentive plan of FivePrime) issued by FivePrime and held by Executive on the Termination Date shall accelerate, and (ii) any reacquisition or repurchase rights held by FivePrime with respect to common stock of FivePrime issued or issuable (or with respect to other rights with respect to stock of FivePrime issued or issuable) pursuant to any other stock award granted to Executive pursuant to any equity incentive plan of FivePrime shall lapse with respect to fifty percent (50%) of those shares then unvested as of the Termination Date.

ARTICLE 4

Limitations and Conditions on Benefits

4.1 Rights Conditioned on Compliance. Executive's rights to receive all severance benefits described in Article 2 and Article 3 shall be conditioned upon and subject to Executive's compliance with the limitations and conditions on benefits as described in this Article 4.

4.2 Continuation of Service Until Date of Termination. Executive shall continue to provide service to FivePrime in good faith until the Termination Date, unless such performance is otherwise excused in writing by FivePrime.

4.3 Release Prior to Payment of Benefits. Upon the occurrence of a Change in Control Termination or a Covered Termination, as applicable, and prior to the provision or payment of any benefits under this Agreement on account of such Change in Control Termination or Covered Termination, as applicable, Executive must execute a general waiver and release in substantially the form attached hereto and incorporated herein as **Exhibit A**, or **Exhibit B**, as appropriate (each a "Release"), and such release must become effective in accordance with its terms, but in no event later than 60 days following the Termination Date. No amount shall be paid prior to such date. Instead, on the 60th day following the Termination Date, FivePrime will pay Executive the severance amount that Executive would otherwise have received on or prior to such date but for the delay in payment related to the effectiveness of the Release, with the balance of the

severance amount being paid as originally scheduled. FivePrime may modify the Release in its discretion to comply with changes in applicable law at any time prior to Executive's execution of such Release. Such Release shall specifically relate to all of Executive's rights and claims in existence at the time of such execution and shall confirm Executive's obligations under Executive's Proprietary Information and Inventions Agreement (or any successor agreement thereto) and any similar obligations under applicable law. It is understood that, as specified in the applicable Release, Executive has a certain number of calendar days to consider whether to execute such Release. If Executive does not execute such Release within the applicable period, no benefits shall be provided or payable under, and Executive shall have no further rights, title or interests in or to any severance benefits or payments pursuant to, this Agreement. It is further understood that in connection with a Change in Control Termination or a Covered Termination, as applicable, Executive may revoke the applicable Release within seven calendar days after its execution by Executive. If Executive revokes such Release within such subsequent seven-day period, no benefits shall be provided or payable under this Agreement pursuant to such Change in Control Termination or Covered Termination, as applicable.

4.4 Return of Company Property. Not later than the Termination Date, Executive shall return to FivePrime all documents (and all copies thereof) and other property belonging to FivePrime that Executive has in his possession or control. The documents and property to be returned include, but are not limited to, all files, correspondence, email, memoranda, notes, notebooks, records, plans, forecasts, reports, studies, analyses, compilations of data, proposals, agreements, financial information, research and development information, marketing information, operational and personnel information, databases, computer-recorded information, tangible property and equipment (including computers, facsimile machines, mobile telephones, and servers), credit cards, entry cards, identification badges and keys; and any materials of any kind that contain or embody any proprietary or confidential information of FivePrime (and all reproductions thereof in whole or in part). Executive agrees to make a diligent search to locate any such documents, property and information. If Executive has used any personally owned computer, server, or e-mail system to receive, store, review, prepare or transmit any Company confidential or proprietary data, materials or information, then within 10 business days after the Termination Date, Executive shall provide FivePrime with a computer-useable copy of all such information and then permanently delete and expunge such confidential or proprietary information from those systems. Executive agrees to provide FivePrime access to Executive's system as requested to verify that the necessary copying or deletion is done.

4.5 Cooperation and Continued Compliance.

(a) From and after the Termination Date, Executive shall cooperate fully with FivePrime in connection with its actual or contemplated defense, prosecution, or investigation of any existing or future litigation, arbitrations, mediations, claims, demands, audits, government or regulatory inquiries, or other matters arising from

events, acts, or failures to act that occurred during the time period in which Executive was employed by FivePrime (including any period of employment with an entity acquired by FivePrime). Such cooperation includes being available upon reasonable notice, without subpoena, to provide accurate and complete advice, assistance and information to FivePrime, including offering and explaining evidence, providing truthful and accurate sworn statements, and participating in discovery and trial preparation and testimony. Executive also agrees to promptly send FivePrime copies of all correspondence (for example subpoenas) received by Executive in connection with any such legal proceedings, unless Executive is expressly prohibited by law from so doing. FivePrime will reimburse Executive for reasonable out-of-pocket expenses incurred in connection with any such cooperation (excluding foregone wages, salary, or other compensation) within 30 days of Executive's timely presentation of appropriate documentation thereof, in accordance with FivePrime's standard reimbursement policies and procedures, and will make reasonable efforts to accommodate Executive's scheduling needs. To the extent that any taxable reimbursements of expenses are provided hereunder, they shall be made or provided in accordance with Section 409A of the Code, including the following provisions: (i) the amount of any such expense reimbursement provided during Executive's taxable year shall not affect any expenses eligible for reimbursement in any other taxable year; (ii) the reimbursement of the eligible expense shall be made no later than the last day of Executive's taxable year that immediately follows the taxable year in which the expense was incurred; and (iii) the right to any reimbursement shall not be subject to liquidation or exchange for another benefit or payment.

(b) From and after the Termination Date, Executive shall continue to abide by all of the terms and provisions of the Confidential Information and Innovation Assignment Agreement between FivePrime and Executive (and any other comparable agreement signed by Executive), in accordance with its terms.

(c) Executive acknowledges and agrees that Executive's obligations under this Section 4.5 are an essential part of the consideration Executive is providing hereunder in exchange for which and in reliance upon which FivePrime has agreed to provide the payments and benefits under this Agreement. Executive further acknowledges and agrees that Executive's violation of Section 4.5 inevitably would involve use or disclosure of FivePrime's proprietary and confidential information. Accordingly, Executive agrees that Executive will forfeit, effective as of the date of any breach, any right, entitlement, claim or interest in or to any unpaid portion of the severance payments or benefits provided in Article 2 or Article 3.

4.6 Parachute Payments.

(a) **Parachute Payment Limitation**. If any payment or benefit (including payments and benefits pursuant to this Agreement) Executive would receive in connection with a Change in Control from FivePrime or otherwise ("Payment") would (i) constitute a "parachute payment" within the meaning of Section 280G of the Code,

and (ii) but for this sentence, be subject to the excise tax imposed by Section 4999 of the Code (the "Excise Tax"), then FivePrime shall cause to be determined, before any amounts of the Payment are paid to Executive, which of the following two alternative forms of payment shall be paid to Executive: (i) payment in full of the entire amount of the Payment (a "Full Payment"), or (ii) payment of only a part of the Payment so that Executive receives the largest payment possible without the imposition of the Excise Tax (a "Reduced Payment"). A Full Payment shall be made in the event that the quotient obtained by dividing (i) the excess of (a) the Full Payment, over (b) the Reduced Payment, by (ii) the Reduced Payment, is greater than ten percent (10%). A Reduced Payment shall be made in the event that the quotient obtained by dividing (i) the excess of (a) the Full Payment, over (b) the Reduced Payment, by (ii) the Reduced Payment, is less than or equal to ten percent (10%). If a Reduced Payment is made, (i) the Payment shall be paid only to the extent permitted under the Reduced Payment alternative, and Executive shall have no rights to any additional payments or benefits constituting the Payment, and (ii) reduction in payments or benefits shall occur in the following order: (1) reduction of cash payments; (2) cancellation of accelerated vesting of equity awards other than stock options; (3) cancellation of accelerated vesting of stock options; and (4) reduction of other benefits paid to Executive. In the event that acceleration of compensation from Executive's equity awards is to be reduced, such acceleration of vesting shall be canceled in the reverse order of the date of grant.

(b) The independent registered public accounting firm engaged by FivePrime for general audit purposes as of the day prior to the effective date of the Change in Control shall make all determinations required to be made under this Section 4.6. If the independent registered public accounting firm so engaged by FivePrime is serving as accountant or auditor for the individual, entity or group effecting the Change in Control, FivePrime shall appoint a nationally recognized independent registered public accounting firm to make the determinations required hereunder. FivePrime shall bear all expenses with respect to the determinations by such independent registered public accounting firm required to be made hereunder.

(c) The independent registered public accounting firm engaged to make the determinations hereunder shall provide its calculations, together with detailed supporting documentation, to FivePrime and Executive within 15 calendar days after the date on which Executive's right to a Payment is triggered (if requested at that time by FivePrime or Executive) or such other time as requested by FivePrime or Executive. If the independent registered public accounting firm determines that no Excise Tax is payable with respect to a Payment, either before or after the application of the Reduced Amount, it shall furnish FivePrime and Executive with an opinion reasonably acceptable to Executive that no Excise Tax will be imposed with respect to such Payment. Any good faith determinations of the accounting firm made hereunder shall be final, binding and conclusive upon FivePrime and Executive.

4.7 Certain Reductions and Offsets. To the extent that any federal, state or local laws, including the Worker Adjustment and Retraining Notification Act (the "WARN

Act") or any other so-called "plant closing" laws, require FivePrime to give advance notice or make a payment of any kind to Executive because of Executive's involuntary termination due to a layoff, reduction in force, plant or facility closing, sale of business, change in control, or any other similar event or reason, the benefits payable under this Agreement shall be correspondingly reduced. The benefits provided under this Agreement are intended to satisfy any and all statutory obligations that may arise out of Executive's involuntary termination of employment for the foregoing reasons, and the parties shall construe and enforce the terms of this Agreement accordingly.

4.8 Mitigation. Except as otherwise specifically provided herein, Executive shall not be required to mitigate damages or the amount of any payment provided under this Agreement by seeking other employment or otherwise, nor shall the amount of any payment provided for under this Agreement be reduced by any compensation earned by Executive as a result of employment by another employer or by any retirement benefits received by Executive after the date of a Change in Control Termination or Covered Termination (except as expressly provided in Sections 2.3 and 3.3 above).

4.9 Indebtedness of Executive. If Executive is indebted to FivePrime on the effective date of a Change in Control Termination or Covered Termination, FivePrime reserves the right to offset any severance payments and benefits under this Agreement by the amount of such indebtedness.

4.10 Application of Section 409A. It is intended that each installment of the payments provided for in this Agreement is a separate "payment" for purposes of Treasury Regulation Section 1.409A-2(b)(2)(i). For the avoidance of doubt, it is intended that the payments under this Agreement satisfy, to the greatest extent possible, the exemptions from the application of Code Section 409A provided under Treasury Regulation Sections 1.409A-1(b)(4), 1.409A-1(b)(5) and 1.409A-1(b)(9). However, if FivePrime (or, if applicable, the successor entity thereto) determines that the severance payments provided under this agreement (the "Agreement Payments") constitute "deferred compensation" under Section 409A and Executive is, on the termination of service, a "specified employee" of FivePrime or any successor entity thereto, as such term is defined in Section 409A(a)(2)(B)(i) of the Code, then, solely to the extent necessary to avoid the incurrence of the adverse personal tax consequences under Code Section 409A, the timing of the Agreement Payments shall be delayed as follows: on the earlier to occur of (i) the date that is six months and one day after Executive's separation from service or (ii) the date of Executive's death (such earlier date, the "Delayed Initial Payment Date"), FivePrime (or the successor entity thereto, as applicable) shall (A) pay Executive a lump sum amount equal to the sum of the Agreement Payments that he would otherwise have received through the Delayed Initial Payment Date if the commencement of the payment of the Agreement Payments had not been so delayed pursuant to this paragraph and (B) commence paying the balance of the Agreement Payments in accordance with the applicable payment schedules set forth in this agreement.

4.11 **Tax Withholding**. All payments under this Agreement shall be subject to applicable withholding for federal, state and local income and employment taxes.

ARTICLE 5

Other Rights and Benefits

Nothing in this Agreement shall prevent or limit Executive's continuing or future participation in any benefit, bonus, incentive or other plans, programs, policies or practices provided by FivePrime and for which Executive may otherwise qualify, nor shall anything herein limit or otherwise affect such rights as Executive may have under other agreements with FivePrime except as provided in Section 1.4 above. Except as otherwise expressly provided herein, amounts that are vested benefits or that Executive is otherwise entitled to receive under any plan, policy, practice or program of FivePrime at or subsequent to the date of a Change in Control shall be payable in accordance with such plan, policy, practice or program.

ARTICLE 6

Definitions

therwise provided, for purposes of this Agreement, the following definitions shall apply:

6.1 "Base Salary" means 1/12th of the greater of (i) Executive's annual base salary (excluding incentive pay, premium pay, commissions, overtime, bonuses, and other forms of variable compensation) as in effect immediately prior to a Change in Control Termination or a Covered Termination, as applicable, or (ii) in the case of a Change in Control Termination, Executive's annual base salary (excluding incentive pay, premium pay, commissions, overtime, bonuses, and other forms of variable compensation) as in effect immediately prior to a Change in Control.

6.2 "Board" means the Board of Directors of FivePrime.

6.3 "Cause" means Executive's: (i) dishonest statements or acts with respect to FivePrime, any subsidiary or any affiliate of FivePrime or any subsidiary; (ii) commission by or indictment for (A) a felony or (B) any misdemeanor (excluding minor traffic violations) involving moral turpitude, deceit, dishonesty or fraud ("indictment," for these purposes, meaning an indictment, probable cause hearing or any other procedure pursuant to which an initial determination of probable or reasonable cause with respect to such offense is made); (iii) gross negligence, willful misconduct or insubordination with respect to FivePrime, any subsidiary or any affiliate of FivePrime or any subsidiary; (iv) material breach of any of Executive's obligations under any agreement to which Executive and FivePrime or any subsidiary are a party; or (v) death or disability. With respect to item (iv), Executive will be given notice and a 30-day period in which to cure such breach, only to the extent such breach can be reasonably expected to be able to

be cured within such period. Executive agrees that the breach of any non-solicitation or confidentiality obligation to FivePrime or any subsidiary shall not be curable to any extent.

6.4 "Change in Control" means the occurrence, in a single transaction or in a series of related transactions, of any one or more of the following events:

(a) Any natural person, entity or group within the meaning of Section 13(d) or 14(d) of the Securities Exchange Act of 1934 ("Exchange Act Person") becomes the owner, directly or indirectly, of securities of FivePrime representing more than fifty percent (50%) of the combined voting power of FivePrime's then outstanding securities other than by virtue of a merger, consolidation or similar transaction. Notwithstanding the foregoing, a Change in Control shall not be deemed to occur (i) on account of the acquisition of securities of FivePrime by any institutional investor, any affiliate thereof or any other Exchange Act Person that acquires FivePrime's securities in a transaction or series of related transactions that are primarily a private financing transaction for FivePrime or (ii) solely because the level of ownership held by any Exchange Act Person (the "Subject Person") exceeds the designated percentage threshold of the outstanding voting securities as a result of a repurchase or other acquisition of voting securities by FivePrime reducing the number of shares outstanding, provided that if a Change in Control would occur (but for the operation of this sentence) as a result of the acquisition of voting securities by FivePrime, and after such share acquisition, the Subject Person becomes the Owner of any additional voting securities that, assuming the repurchase or other acquisition had not occurred, increases the percentage of the then outstanding voting securities owned by the Subject Person over the designated percentage threshold, then a Change in Control shall be deemed to occur;

(b) There is consummated a merger, consolidation or similar transaction involving (directly or indirectly) FivePrime if, immediately after the consummation of such merger, consolidation or similar transaction, the stockholders of FivePrime immediately prior thereto do not own, directly or indirectly, either (i) outstanding voting securities representing more than fifty percent (50%) of the combined outstanding voting power of the surviving entity in such merger, consolidation or similar transaction or (ii) more than fifty percent (50%) of the combined outstanding voting power of the parent of the surviving entity in such merger, consolidation or similar transaction;

(c) The stockholders of FivePrime approve or the Board approves a plan of complete dissolution or liquidation of FivePrime, or a complete dissolution or liquidation of FivePrime shall otherwise occur; or

(d) There is consummated a sale, lease, license or other disposition of all or substantially all of the consolidated assets of FivePrime and its subsidiaries, other than a sale, lease, license or other disposition of all or substantially all of the

consolidated assets of FivePrime and its subsidiaries to an entity, more than fifty percent (50%) of the combined voting power of the voting securities of which are owned by stockholders of FivePrime in substantially the same proportion as their ownership of FivePrime immediately prior to such sale, lease, license or other disposition.

The term Change in Control shall not include a sale of assets, merger or other transaction effected exclusively for the purpose of changing the domicile of FivePrime. Notwithstanding the foregoing or any other provision of this Agreement, the definition of Change in Control (or any analogous term) in an individual written agreement between FivePrime or any affiliate and the participant shall supersede the foregoing definition with respect to stock awards subject to such agreement (it being understood, however, that if no definition of Change in Control or any analogous term is set forth in such an individual written agreement, the foregoing definition shall apply).

6.5 "Change in Control Severance Period" means the period of 18 months commencing on the Termination Date.

6.6 "Change in Control Termination" means an "Involuntary Termination Without Cause" or "Resignation for Good Reason," either of which occurs on, or within three months prior to, or within 12 months following, the effective date of a Change in Control, provided that any such termination is a "separation from service" within the meaning of Treasury Regulation Section 1.409A-1(h). Death and disability shall not be deemed Change in Control Terminations.

6.7 "COBRA" means the Consolidated Omnibus Budget Reconciliation Act of 1985, as amended.

6.8 "Code" means the Internal Revenue Code of 1986, as amended.

6.9 "Company" means Five Prime Therapeutics, Inc. or, following a Change in Control, the surviving entity resulting from such transaction, or any subsequent surviving entity resulting from any subsequent Change in Control.

6.10 "Covered Termination" means an "Involuntary Termination Without Cause", provided that any such termination is a "separation from service" within the meaning of Treasury Regulation Section 1.409A-1(h). Death, disability, and termination of employment by Executive, shall not be deemed Covered Terminations.

6.11 "Covered Termination Severance Period" means the period of nine months commencing on the Termination Date.

6.12 "Involuntary Termination Without Cause" means Executive's dismissal or discharge by FivePrime for reasons other than Cause and other than as a result of death or disability.

6.13 "Pro-Rata Bonus" means 1/12th of the greater of (i) the average annual bonus paid to Executive for the three years preceding the date of a Change in Control Termination or Covered Termination, as applicable, (or such lesser number of years during which Executive has been employed by FivePrime), or (ii) annual target cash bonus, as in effect immediately prior to a Change in Control Termination or Covered Termination, as applicable.

6.14 "Resignation for Good Reason" means Executive's resignation from all employee positions Executive then-holds with FivePrime within 60 days following any of the following events taken without Executive's consent, provided Executive has given FivePrime written notice of such event within 30 days after the first occurrence of such event and FivePrime has not cured such event within 30 days thereafter:

(a) A decrease in Executive's total target cash compensation (base and bonus) of more than 10% (i.e., a material reduction in Executive's base compensation and a material breach by FivePrime of Executive's employment terms with FivePrime), other than in connection with a comparable decrease in compensation for all comparable executives of FivePrime;

(b) Executive's duties or responsibilities are materially diminished (not simply a change in title or reporting relationships); Executive shall not be deemed to have a "Resignation for Good Reason" if FivePrime survives as a separate legal entity or business unit following the Change in Control and Executive holds materially the same position in such legal entity or business unit as Executive held before the Change in Control;

(c) An increase in Executive's round-trip driving distance of more than 50 miles from Executive's principal personal residence to the principal office or business location at which Executive is required to perform services (except for required business travel to the extent consistent with Executive's prior business travel obligations); or

(d) The failure of FivePrime to obtain a satisfactory agreement from any successor to materially assume and materially agree to perform under the terms of this Agreement.

6.15 "Termination Date" means the effective date of the Change in Control Termination or Covered Termination, as applicable.

ARTICLE 7

General Provisions

7.1 **Employment Status.** This Agreement does not constitute a contract of employment or impose upon Executive any obligation to remain as an employee, or impose on FivePrime any obligation (i) to retain Executive as an employee, (ii) to

change the status of Executive as an at-will employee or (iii) to change FivePrime's policies regarding termination of employment.

7.2 Notices. Any notices provided hereunder must be in writing, and such notices or any other written communication shall be deemed effective upon the earlier of personal delivery (including personal delivery by facsimile) or the third day after mailing by first class mail, to FivePrime at its primary office location and to Executive at Executive's address as listed in FivePrime's payroll records. Any payments made by FivePrime to Executive under the terms of this Agreement shall be delivered to Executive either in person or at the address as listed in FivePrime's payroll records.

7.3 Severability. Whenever possible, each provision of this Agreement will be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be invalid, illegal or unenforceable in any respect under any applicable law or rule in any jurisdiction, such invalidity, illegality or unenforceability will not affect any other provision or any other jurisdiction, but this Agreement will be reformed, construed and enforced in such jurisdiction as if such invalid, illegal or unenforceable provisions had never been contained herein.

7.4 Waiver. If either party should waive any breach of any provisions of this Agreement, he, she or it shall not thereby be deemed to have waived any preceding or succeeding breach of the same or any other provision of this Agreement.

7.5 Arbitration. Unless otherwise prohibited by law or specified below, all disputes, claims and causes of action, in law or equity, arising from or relating to this Agreement or its enforcement, performance, breach, or interpretation shall be resolved solely and exclusively by final and binding arbitration held in the San Francisco Bay Area through Judicial Arbitration & Mediation Services/Endispute ("JAMS") under the then existing JAMS employment law arbitration rules. However, nothing in this Section 7.5 is intended to prevent either party from obtaining injunctive relief in court to prevent irreparable harm pending the conclusion of any such arbitration. Each party in any such arbitration shall be responsible for its own attorneys' fees, costs and necessary disbursement; *provided, however,* that in the event one party refuses to arbitrate and the other party seeks to compel arbitration by court order, if such other party prevails, it shall be entitled to recover reasonable attorneys' fees, costs and necessary disbursements. Pursuant to California Civil Code Section 1717, each party warrants that it was represented by counsel in the negotiation and execution of this Agreement, including the attorneys' fees provision herein.

7.6 Complete Agreement. This Agreement, including **Exhibit A** and **Exhibit B**, constitutes the entire agreement between Executive and FivePrime and is the complete, final, and exclusive embodiment of their agreement with regard to this subject matter, wholly superseding all written and oral agreements with respect to payments and benefits to Executive in the event of employment termination. It is entered into

without reliance on any promise or representation other than those expressly contained herein.

7.7 Amendment or Termination of Agreement; Continuation of Agreement. This Agreement may be changed or terminated only upon the mutual written consent of FivePrime and Executive. The written consent of FivePrime to a change or termination of this Agreement must be signed by an executive officer of FivePrime (other than Executive) after such change or termination has been approved by the Board. Unless so terminated, this Agreement shall continue in effect for as long as Executive continues to be employed by FivePrime or by any surviving entity following any Change in Control. In other words, if, following a Change in Control, Executive continues to be employed by the surviving entity without a Change in Control Termination and the surviving entity then undergoes a Change in Control, following which Executive is terminated by the subsequent surviving entity in a Change in Control Termination, then Executive shall receive the benefits described in Article 2 hereof.

7.8 Counterparts. This Agreement may be executed in separate counterparts, any one of which need not contain signatures of more than one party, but all of which taken together will constitute one and the same Agreement.

7.9 Headings. The headings of the Articles and Sections hereof are inserted for convenience only and shall not be deemed to constitute a part hereof nor to affect the meaning thereof.

7.10 Successors and Assigns. This Agreement is intended to bind and inure to the benefit of and be enforceable by Executive, and FivePrime, and any surviving entity resulting from a Change in Control and upon any other person who is a successor by merger, acquisition, consolidation or otherwise to the business formerly carried on by FivePrime, and their respective successors, assigns, heirs, executors and administrators, without regard to whether or not such person actively assumes any rights or duties hereunder; *provided, however,* that Executive may not assign any duties hereunder and may not assign any rights hereunder without the written consent of FivePrime, which consent shall not be withheld unreasonably.

7.11 ERISA. This Agreement is intended to constitute a severance agreement subject to the Employee Retirement Income Security Act of 1974, as amended ("ERISA").

7.12 Choice of Law. To the extent not preempted by ERISA, all questions concerning the construction, validity and interpretation of this Agreement will be governed by the law of the State of California, without regard to such state's conflict of laws rules.

7.13 Construction of Agreement. In the event of a conflict between the text of this Agreement and any summary, description or other information regarding this Agreement, the text of this Agreement shall control.

7.14 Circular 230 Disclaimer. The following disclaimer is provided in accordance with the Internal Revenue Service's Circular 230 (21 C.F.R. Part 10). Any tax advice contained in this Agreement is intended to be preliminary, for discussion purposes only, and not final. Any such advice is not intended to be used for marketing, promoting or recommending any transaction or for the use of any person in connection with the preparation of any tax return. Accordingly, this advice is not intended or written to be used, and it cannot be used, by any person for the purpose of avoiding tax penalties that may be imposed on such person.

IN WITNESS WHEREOF, the parties have executed this Agreement on the Effective Date.

Five Prime Therapeutics, Inc.

By: /s/ Aron Knickerbocker
Aron Knickerbocker
President and Chief Executive Officer

/s/ David V. Smith
David V. Smith

Exhibit A

RELEASE
(Individual Termination – Age 40 or Older)

Certain capitalized terms used in this Release are defined in the Executive Change in Control Severance Benefits Agreement (the "Agreement") which I have executed and of which this Release is a part.

I hereby confirm my obligations under FivePrime's Employee Confidentiality and Inventions Assignment Agreement (or other comparable agreement that I have signed, if any).

I acknowledge that I have read and understand Section 1542 of the California Civil Code which reads as follows: "**A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.**" I hereby expressly waive and relinquish all rights and benefits under that section and any law of any jurisdiction of similar effect with respect to my release of any claims provided herein.

Except as otherwise set forth in this Release, I hereby release, acquit and forever discharge FivePrime, its parents and subsidiaries, and their officers, directors, agents, servants, employees, shareholders, successors, assigns and affiliates, of and from any and all claims, liabilities, demands, causes of action, costs, expenses, attorneys fees, damages, indemnities and obligations of every kind and nature, in law, equity, or otherwise, known and unknown, suspected and unsuspected, disclosed and undisclosed (other than any claim for indemnification I may have as a result of any third party action against me based on my employment with FivePrime), arising out of or in any way related to agreements, events, acts or conduct at any time prior to the date I execute this Release, including all such claims and demands directly or indirectly arising out of or in any way connected with my employment with FivePrime or the termination of that employment, including claims of intentional and negligent infliction of emotional distress, any and all tort claims for personal injury, claims or demands related to salary, bonuses, commissions, stock, stock options, or any other ownership interests in FivePrime, vacation pay, fringe benefits, expense reimbursements, severance pay, or any other form of compensation; claims pursuant to any federal, state or local law or cause of action including the federal Civil Rights Act of 1964, as amended; the federal Age Discrimination in Employment Act of 1967, as amended ("ADEA"); the federal Employee Retirement Income Security Act of 1974, as amended; the federal Americans with Disabilities Act of 1990; the California Fair Employment and Housing Act, as amended; tort law; contract law; wrongful discharge; discrimination; fraud; defamation; emotional distress; and breach of the implied covenant of good faith and fair dealing; *provided, however,* that nothing in this paragraph shall be construed in any way to

release FivePrime from its obligation to indemnify me pursuant to FivePrime's indemnification obligation pursuant to written agreement or applicable law.

I acknowledge that I am knowingly and voluntarily waiving and releasing any rights I may have under ADEA. I also acknowledge that the consideration given under this Agreement for the waiver and release in the preceding paragraph hereof is in addition to anything of value to which I was already entitled. I further acknowledge that I have been advised by this writing, as required by the ADEA, that: (A) my waiver and release do not apply to any rights or claims that may arise on or after the date I execute this Release; (B) I have the right to consult with an attorney prior to executing this Release; (C) I have 21 days to consider this Release (although I may choose to voluntarily execute this Release earlier); (D) I have seven days following my execution of this Release to revoke the Release by providing a written notice of revocation to FivePrime's Chief Executive Officer; and (E) this Release shall not be effective until the date upon which the revocation period has expired, which shall be the eighth day after I execute this Release (provided that I do not revoke it).

I hereby represent that I have been paid all compensation owed and for all hours worked, I have received all the leave and leave benefits and protections for which I am eligible, pursuant to the federal Family and Medical Leave Act, the California Family Rights Act, any Company policy or applicable law, and I have not suffered any on-the-job injury or illness for which I have not already filed a workers' compensation claim.

David V. Smith

Date:

Exhibit B

RELEASE

(Group Termination – Age 40 or Older)

Certain capitalized terms used in this Release are defined in the Executive Change in Control Severance Benefits Agreement (the "Agreement") which I have executed and of which this Release is a part.

I hereby confirm my obligations under FivePrime's Employee Confidentiality and Inventions Assignment Agreement (or other comparable agreement that I have signed, if any).

I acknowledge that I have read and understand Section 1542 of the California Civil Code which reads as follows: "**A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor.**" I hereby expressly waive and relinquish all rights and benefits under that section and any law of any jurisdiction of similar effect with respect to my release of any claims provided herein.

Except as otherwise set forth in this Release, I hereby release, acquit and forever discharge FivePrime, its parents and subsidiaries, and their officers, directors, agents, servants, employees, shareholders, successors, assigns and affiliates, of and from any and all claims, liabilities, demands, causes of action, costs, expenses, attorneys fees, damages, indemnities and obligations of every kind and nature, in law, equity, or otherwise, known and unknown, suspected and unsuspected, disclosed and undisclosed (other than any claim for indemnification I may have as a result of any third party action against me based on my employment with FivePrime), arising out of or in any way related to agreements, events, acts or conduct at any time prior to the date I execute this Release, including all such claims and demands directly or indirectly arising out of or in any way connected with my employment with FivePrime or the termination of that employment, including claims of intentional and negligent infliction of emotional distress, any and all tort claims for personal injury, claims or demands related to salary, bonuses, commissions, stock, stock options, or any other ownership interests in FivePrime, vacation pay, fringe benefits, expense reimbursements, severance pay, or any other form of compensation; claims pursuant to any federal, state or local law or cause of action including the federal Civil Rights Act of 1964, as amended; the federal Age Discrimination in Employment Act of 1967, as amended ("ADEA"); the federal Employee Retirement Income Security Act of 1974, as amended; the federal Americans with Disabilities Act of 1990; the California Fair Employment and Housing Act, as

amended; tort law; contract law; wrongful discharge; discrimination; fraud; defamation; emotional distress; and breach of the implied covenant of good faith and fair dealing; *provided, however,* that nothing in this paragraph shall be construed in any way to release FivePrime from its obligation to indemnify me pursuant to FivePrime's indemnification obligation pursuant to written agreement or applicable law.

I acknowledge that I am knowingly and voluntarily waiving and releasing any rights I may have under the ADEA. I also acknowledge that the consideration given under this Agreement for the waiver and release in the preceding paragraph hereof is in addition to anything of value to which I was already entitled. I further acknowledge that I have been advised by this writing, as required by the ADEA, that: (A) my waiver and release do not apply to any rights or claims that may arise on or after the date I execute this Release; (B) I have the right to consult with an attorney prior to executing this Release; (C) I have 45 days to consider this Release (although I may choose to voluntarily execute this Release earlier); (D) I have seven days following my execution of this Release to revoke the Release by providing a written notice of revocation to FivePrime's Chief Executive Officer; (E) this Release shall not be effective until the date upon which the revocation period has expired, which shall be the eighth day after I execute this Release; and (F) I have received with this Release the required written disclosure for a "group termination" under the ADEA, including a detailed list of the job titles and ages of all employees who were terminated in this group termination and the ages of all employees of FivePrime in the same job classification or organizational unit who were not terminated.

I hereby represent that I have been paid all compensation owed and for all hours worked, I have received all the leave and leave benefits and protections for which I am eligible, pursuant to the federal Family and Medical Leave Act, the California Family Rights Act, any Company policy or applicable law, and I have not suffered any on-the-job injury or illness for which I have not already filed a workers' compensation claim.

David V. Smith

Date:

Exhibit 10.37

Amendment No. 1 to the Confidential Consulting Agreement

This Amendment No. 1 to the Consulting Agreement (this "Amendment"), effective October 13, 2018 (the "Amendment Effective Date"), is made and entered into by and between Five Prime Therapeutics, Inc., a Delaware corporation ("Client"), and FLG Partners, LLC, a California limited liability company ("FLG").

Background

A. Client and FLG are parties to the Confidential Consulting Agreement, dated April 13, 2018 (the "Agreement").

B. Pursuant to Section 11(G) of the Agreement, any term or provision of the Agreement may be amended only by a writing signed by the parties.

C. Client and FLG desire to amend certain provisions of the Agreement as set forth in this Amendment.

NOW, THEREFORE, Client and FLG agree as follows:

1. Amendment of the Agreement. Client and FLG agree to amend the terms of the Agreement as provided below, effective as of the Amendment Effective Date. Capitalized terms used in this Amendment that are not otherwise defined herein shall have the same meanings as such terms are given in the Agreement.

2. Term. Section 6 of Exhibit A to the Agreement is hereby amended and restated in its entirety as set forth below:

"Term. The later of twelve months from the Effective Date or upon the completion of Services, unless earlier terminated pursuant to Paragraph 4 of the Agreement."

3. Miscellaneous.

3.1 Full Force and Effect. All terms and conditions set forth in the Agreement that are not amended hereby shall remain in full force and effect.

3.2 Entire Agreement. The Agreement, as amended by this Amendment, sets forth the entire understanding of Client and FLG relating to the subject matter thereof and supersedes all prior agreements and understandings between Client and FLG relating to the subject matter thereof.

3.3 Modification. This Amendment may not be modified or amended in any way unless done so in accordance with Section 11(G) of the Agreement.

3.4 Counterparts. This Amendment may be executed in counterparts, each of which shall constitute an original and both of which, when taken together, shall constitute one agreement. The exchange of a fully executed Amendment (in counterparts or otherwise) by electronic transmission, including by email, or facsimile shall be sufficient to bind Client and FLG to the terms and conditions of this Amendment.

IN WITNESS WHEREOF, Client and FLG have executed this Amendment with effect as of the Amendment Effective Date.

Five Prime Therapeutics, Inc.	**FLG Partners, LLC**
By: /s/ Jeff Coon	By: /s/ Jeffrey Kuhn
Name: Jeff Coon	Name: Jeffrey Kuhn
Title: SVP, Human Resources	Title: Administrative Partner

Exhibit 10.42

AMENDMENT No. 1

to the

NON-EXCLUSIVE LICENSE AGREEMENT

Dated 6 February 2012

Between

LONZA SALES AG

and

FIVE PRIME THERAPEUTICS, INC.

and

BIOWA, INC.

LGL-2015

B15265/IS/KJ/31May13

[***] = Certain confidential information contained in this document, marked by brackets, has been omitted and filed separately with the Securities and Exchange Commission pursuant to Rule 24b-2 of the Securities Exchange Act of 1934, as amended.

THIS AMENDMENT is made the 6th day of June, 2013

BETWEEN

BIOWA, INC., a Delaware corporation, with a principal place of business at 9420 Athena Circle, La Jolla, California 92037, USA ("BioWa")

AND

LONZA SALES AG incorporated and registered in Switzerland whose registered office is at Muenchensteinerstrasse 38, CH-4002, Basel, Switzerland, ("Lonza")

(together the "Licensor")

AND

FIVE PRIME THERAPEUTICS, INC. of Two Corporate Drive, South San Francisco,
California 94080, USA ("Licensee").

WHEREAS

A. Licensor and Licensee entered into a Non-Exclusive License Agreement dated 6 February 2012 (hereinafter referred to as the "Agreement") under which Licensor released materials to Licensee for the purposes of the Commercial License (all as therein defined); and

B. Licensee now wishes to provide certain materials to third parties in connection with Licensee's further use of the Licensed Technology; and

C. Licensor and Licensee now wish to amend the terms of the Agreement.

NOW THEREFORE in consideration of the mutual promises and covenants contained herein and other good and valuable consideration the sufficiency of which is acknowledged it is hereby agreed by and between the parties to amend the Agreement as follows:

1. The words and phrases defined in the Agreement shall have the same meanings in this Amendment. In addition, the following term shall have the meaning shown:

   "[***]" means [***] of [***].

2. Subject to clause 3 below, following signature of this Amendment No. 1 to the Agreement by the parties, Licensee shall be permitted to supply to [***] the following materials:

   1. The Vector [***] identified in clause 3.1 (a) of the Agreement and related Licensor Know-How; and
   2. [***] of Potelligent® CHOK1SV from which [***] to be used as a [***].

(together, "the Characterisation Materials")

3. Licensor hereby consents to Licensee supplying the Characterisation Materials to [***] for the sole purpose of [***] using the Characterisation Materials for [***]; provided that [***] shall not use the Characterisation Materials or cause or permit the Characterisation Materials to be used in any way for human in vivo studies or for commercial purposes including but without limitation the manufacture, use, marketing and sale of any Product or any product containing or derived from a Product.

4. Licensee shall ensure that [***] use the Characterisation Materials solely as expressly permitted in clause 3 above and for no other purpose whatsoever. Licensee is responsible for the strict adherence to the relevant terms of the Agreement, including this Amendment No. 1 to the Agreement, by [***].

5. On termination or expiry, whichever occurs earlier, of the Agreement or Licensee's arrangements with [***], Licensee shall ensure that [***] destroys or returns to Licensee the Characterisation Materials supplied by Licensee to [***] under clause 3 above, as well as any materials resulting or derived therefrom.

6. For the avoidance of doubt, Licensee hereby confirms that neither Licensee nor [***] shall perform any analysis, test, experiment, modification or reverse-engineering on any part of the Licensed Technology.

7. Save as herein provided all other terms and conditions of the Agreement shall remain in full force and effect.

IN WITNESS WHEREOF the parties have caused this Amendment No. 1 to be executed by their respective representatives thereunto duly authorised as of the day and year first above written.

Signed for and on behalf of
LONZA SALES AG

/s/ Nadia Zleger

/s/ Jaret White

Nadia Zleger
Legal Counsel

TITLE

Signed for and on behalf of
LONZA SALES AG

Jaret White
Head Development

TITLE

President and CEO

/s/

TITLE

Signed for and on behalf of
BIOWA, INC.

/s/ Aron Knickerbocker

Signed for and on behalf of
FIVE PRIME THERAPEUTICS, INC.

Aron Knickerbocker
Senior VP-Business Development

TITLE

B15265/IS/KJ/31May13

[***] = CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY BRACKETS, HAS BEEN OMITTED AND FILED SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO RULE 24B-2 OF THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

Execution Copy
Exhibit 10.43

AMENDMENT No. 2

to the

NON-EXCLUSIVE LICENSE AGREEMENT

Dated 6 February 2012

Between

BIOWA, INC.

and

LONZA SALES AG

and

FIVE PRIME THERAPEUTICS, INC.

LGL-4454
CONFIDENTIAL

[***] = CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY BRACKETS, HAS BEEN OMITTED AND FILED SEPARATELY WITH THE SECURITIES AND EXCHANGE COMMISSION PURSUANT TO RULE 24B-2 OF THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED.

THIS AMENDMENT No. 2 (this “Amendment”) is made the 17th day of April, 2018 (the “Effective Date”)

BETWEEN

BIOWA, INC., a Delaware corporation, with a principal place of business at 212 Carnegie Center, Suite 400, Princeton, NJ 08540, USA (“BioWa”)

AND

LONZA SALES AG incorporated and registered in Switzerland whose registered office is at Muenchensteinerstrasse 38, CH-4002, Basel, Switzerland, (“Lonza")

(together the “Licensor”)

AND

FIVE PRIME THERAPEUTICS, INC., a Delaware corporation with a principal place of business at 111 Oyster Point Boulevard, South San Francisco, California 94080, USA (“Licensee”).

WHEREAS

A. Licensor and Licensee entered into a Non-Exclusive License Agreement dated 6 February 2012, as amended on 6 June 2013 (hereinafter referred to as the “Agreement”) under which (inter alia) Licensor released materials to Licensee for the purposes of the Commercial License (all as therein defined); and.

B. Licensor and Licensee now wish to amend the terms of the Agreement.

NOW THEREFORE in consideration of the mutual promises and covenants contained herein and other good and valuable consideration the sufficiency of which is acknowledged, and intending to be legally bound, it is hereby agreed by and between the Parties to amend the Agreement as follows:

1. Capitalized terms used in this Amendment No. 2 and not otherwise defined herein shall have the same meanings ascribed to such terms in the Agreement.

2. In accordance with Section 2.2.2 of the Agreement, Licensor hereby consents to Licensee's written request dated December 9, 2016 that Licensor consent to: (i) the transfer of Transfected Cells by the Licensee to [***], a [***] (hereafter "[***]") at its [***] facility only, notwithstanding the fact that the Parties understand that [***] is, as of the date of this Amendment No. 2, a Competing Contract Manufacturer; and (ii) the sublicense to [***] at its [***] facility only of the rights to make the Product only for the benefit of Licensee as granted to Licensee under Section 2.1 of the Agreement. Such sub-licensing referred to in this Amendment No. 2 shall be subject to the terms of the Agreement, including, without limitation, Sections 2.2.3 and 2.3. Licensee shall at all times remain responsible for the acts and omissions of [***] in connection with such sub-licensing as set forth in Section 2.3 of the Agreement.

3. Licensee shall pay to Lonza the initial payment of the Lonza Annual License Fee when and as applicable, in accordance with terms set out under Section 6.3 of the Agreement.

4. Save as herein provided all other terms and conditions of the Agreement shall remain in full force and effect.

[Remainder of page intentionally blank; signature page follows]

IN WITNESS WHEREOF the Parties have caused this Amendment No. 2 to be executed by their respective representatives thereunto duly authorised effective as of the day and year first above written.

Signed for and on behalf of
BIOWA, INC. ../s/ Takeshi Masuda.....

Takeshi Masuda
TITLE: President and CEO

Signed for and on behalf of
LONZA SALES AG .../s/ Albert Pereda.....

...Senior Legal Counsel..... TITLE

Signed for and on behalf of
LONZA SALES AG .../s/ Cordula Altekrüger.....

...Senior Legal Counsel..... TITLE

Signed for and on behalf of
FIVE PRIME THERAPEUTICS, INC. .../s/ Kevin Baker.....

..SVP, Development Sciences.... TITLE

CONFIDENTIAL

Exhibit 10.48

Amendment No. 1 to the License and Collaboration Agreement

This Amendment No. 1 to the License and Collaboration Agreement (this "Amendment"), effective December 21, 2018 (the "Amendment Effective Date"), is made and entered into by and between Five Prime Therapeutics, Inc., a Delaware corporation ("FivePrime"), and Zai Lab (Shanghai) Co., Ltd., a limited company organized under the laws of the People's Republic of China ("Zai").

Background

A. WHEREAS, FivePrime and Zai are parties to that certain License and Collaboration Agreement, dated December 19, 2017 (the "Agreement"), pursuant to which FivePrime granted to Zai an exclusive license to develop and commercialize FPA144 in the Territory (as defined in the Agreement);

B. WHEREAS, pursuant to Section 16.6 of the Agreement, the Agreement may be amended, or any term thereof modified, only by a written instrument duly executed by authorized representatives of both Parties; and

C. WHEREAS, FivePrime and Zai desire to amend certain provisions of the Agreement as set forth in this Amendment.

NOW, THEREFORE, FivePrime and Zai agree as follows:

1. Amendment of the Agreement. FivePrime and Zai agree to amend the terms of the Agreement as provided below, effective as of the Amendment Effective Date. Capitalized terms used in this Amendment that are not otherwise defined herein shall have the same meanings as such terms are given in the Agreement.

2. Commercial Supply Agreement. The first sentence of Section 7.1(b) of the Agreement is hereby amended and restated in its entirety as set forth below.

> "The Parties shall use Commercially Reasonable Efforts to agree on or prior to [***] on the principal terms of a commercial supply agreement (the "***Commercial Supply Agreement***") pursuant to which Zai may purchase commercial supply of a Licensed Product (vialed drug product, labeled or unlabeled) from Five Prime at Five Prime's Fully Burdened Manufacturing Cost in order to fulfill Zai's obligations under this Agreement, which terms shall be consistent with the terms and conditions of this Agreement and the terms and conditions of any agreement between Five Prime and its Third Party manufacturing partner(s), to the extent applicable to commercial supply of Licensed Product in the Field in the Territory."

3. Miscellaneous.

3.1 Full Force and Effect. All terms and conditions set forth in the Agreement, and the rights and obligations of the Parties thereunder, that are not amended hereby shall remain in full force and effect.

3.2 Entire Agreement. The Agreement, as amended by this Amendment, sets forth the entire understanding of FivePrime and Zai relating to the subject matter thereof and supersedes all prior agreements and understandings between FivePrime and Zai relating to the subject matter thereof.

3.3 Counterparts. This Amendment may be executed in one (1) or more counterparts, each of which shall constitute an original and all of which, when taken together, shall constitute one agreement. The exchange of a fully executed Amendment (in counterparts or otherwise) by electronic transmission, including by email, or facsimile shall be sufficient to bind FivePrime and Zai to the terms and conditions of this Amendment.

3.4 Conflicts. Where there is any conflict between the terms of this Amendment and the terms of the Agreement or any other agreement between the Parties (or their Affiliates), the terms and conditions of this Amendment shall prevail.

IN WITNESS WHEREOF, FivePrime and Zai have executed this Amendment with effect as of the Amendment Effective Date.

Five Prime Therapeutics, Inc.	**Zai Lab (Shanghai) Co., Ltd.**
By: /s/ Tarak D. Mody	By: /s/ Samantha Du
Name: Tarak D. Mody, Ph.D.	Name: Samantha Du
Title: VP, Bus Dev & Alliances	Title: Chief Executive Officer

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement on Form S-3 (File No. 333-228206) of Five Prime Therapeutics, Inc.;
(2) Registration Statements on Form S-8 (File Nos. 333-191700, 333-194820, 333-202854, 333-211216, 333-217737 and 333-224748) pertaining to the 2002 Equity Incentive Plan, 2010 Equity Incentive Plan, 2013 Omnibus Incentive Plan and the 2013 Employee Stock Purchase Plan of Five Prime Therapeutics, Inc.;

of our reports dated February 26, 2019, with respect to the financial statements of Five Prime Therapeutics, Inc. and the effectiveness of internal control over financial reporting of Five Prime Therapeutics, Inc. included in this Annual Report on Form 10-K of Five Prime Therapeutics, Inc. for the year ended December 31, 2018.

/s/ Ernst & Young LLP

San Francisco, California
February 26, 2019

Exhibit 31.1

CERTIFICATION OF THE CHIEF EXECUTIVE OFFICER
Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002

I, Aron Knickerbocker, certify that:

1. I have reviewed this annual report on Form 10-K of Five Prime Therapeutics, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Dated: February 26, 2019

/s/ Aron Knickerbocker
Aron Knickerbocker
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF THE CHIEF FINANCIAL OFFICER
Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002

I, David V. Smith, certify that:

1. I have reviewed this annual report on Form 10-K of Five Prime Therapeutics, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Dated: February 26, 2019

/s/ David V. Smith
David V. Smith
Executive Vice President and Chief Financial Officer
(Principal Financial and Accounting Officer)

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K of Five Prime Therapeutics, Inc. ("Five Prime") for the year ended December 31, 2018, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Aron Knickerbocker, President and Chief Executive Officer of Five Prime, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of Five Prime.

Dated: February 26, 2019

/s/ Aron Knickerbocker
Aron Knickerbocker
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K of Five Prime Therapeutics, Inc. ("Five Prime") for the year ended December 31, 2018, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, David V. Smith, Executive Vice President and Chief Financial Officer of Five Prime, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of Five Prime.

Dated: February 26, 2019

/s/ David V. Smith
David V. Smith
Executive Vice President and Chief Financial Officer
(Principal Financial and Accounting Officer)