

Calithera Biosciences, Inc.
Form 10-K
March 07, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

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 001-36644

CALITHERA BIOSCIENCES, INC.

(Exact name of Registrant as specified in its Charter)

Delaware (State or other jurisdiction of incorporation or organization)	27-2366329 (I.R.S. Employer Identification No.)
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343 Oyster Point Blvd., Suite 200

South San Francisco, CA (Address of principal executive offices)	94080 (Zip Code)
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Registrant's telephone number, including area code: (650) 870-1000

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Securities registered pursuant to Section 12(b) of the Act:

Common Stock, Par Value \$0.0001 Per Share (Title of each class)	The NASDAQ Global Select Market (Name of each exchange on which registered)
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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 pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the Registrant was required to submit such files). YES NO

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405) is not contained herein, and will not be contained, to the best of Registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Annual Report on Form 10-K or any amendment to this Annual Report on Form 10-K.

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

Large accelerated filer	Accelerated filer
Non-accelerated filer	Small 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 Exchange Act). YES NO

The aggregate market value of the registrant's common stock held by non-affiliates of the registrant as of the last business day of the registrant's most recently completed second fiscal quarter was approximately \$154.3 million, based on the closing price of the registrant's common stock on the NASDAQ Global Select Market of \$5.00 per share.

The number of shares of Registrant's Common Stock outstanding as of March 4, 2019, was 38,837,698.

DOCUMENTS INCORPORATED BY REFERENCE

The Registrant's Definitive Proxy Statement relating to the 2019 Annual Meeting of Stockholders will be filed with the Securities and Exchange Commission within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K and portions of such are incorporated by reference into Part III of this Annual Report on Form 10-K.

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CAUTIONARY INFORMATION REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K for the year ended December 31, 2018, contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act, which are subject to the “safe harbor” created by those sections, concerning our business, operations, and financial performance and condition as well as our plans, objectives, and expectations for business operations and financial performance and condition. Any statements contained herein that are not of historical facts may be deemed to be forward-looking statements. You can identify these statements by words such as “anticipate,” “assume,” “believe,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “would,” and other similar expressions that are predictions of or indicate future events and future trends. These forward-looking statements are based on current expectations, estimates, forecasts, and projections about our business and the industry in which we operate and management's beliefs and assumptions and are not guarantees of future performance or development and involve known and unknown risks, uncertainties, and other factors that are in some cases beyond our control. As a result, any or all of our forward-looking statements in this Annual Report on Form 10-K may turn out to be inaccurate. Factors that could materially affect our business operations and financial performance and condition include, but are not limited to, those risks and uncertainties described herein under “Item 1A - Risk Factors.” You are urged to consider these factors carefully in evaluating the forward-looking statements and are cautioned not to place undue reliance on the forward-looking statements. The forward-looking statements are based on information available to us as of the filing date of this Annual Report on Form 10-K. Unless required by law, we do not intend to publicly update or revise any forward-looking statements to reflect new information or future events or otherwise. You should, however, review the factors and risks we describe in the reports we will file from time to time with the Securities and Exchange Commission, or the SEC, after the date of this Annual Report on Form 10-K.

PART I

Item 1. Business.

Overview

We are a clinical-stage bio-pharmaceutical company focused on fighting cancer and other life threatening diseases by discovering and developing novel small molecule drugs that target cellular metabolism. Tumor metabolism and immuno-oncology have emerged as promising new fields for cancer drug discovery, and recent clinical successes with therapeutic agents in each field have created fundamentally new potential therapies for cancer patients. With our unique approach, we have established a broad pipeline of small molecule drug candidates that target enzymes controlling metabolically critical pathways in tumor cells and immune cells. We have four internally discovered clinical stage compounds that are all enzyme inhibitors. While we are primarily focused on oncology, we may opportunistically develop therapeutics outside of oncology where we can leverage our existing expertise in immune cell metabolism to treat life-threatening diseases with unmet need.

Through genetic mutations that alter fundamental metabolic pathways, cancer cells can acquire the ability to grow in an uncontrolled manner, but they also acquire nutrient dependencies that can differentiate them from normal cells. Targeting these nutrient dependencies by inhibiting specific metabolic pathways in cancer cells is a novel therapeutic approach to blocking the uncontrolled growth of tumors. Our lead product candidate, telaglenastat (CB-839), takes advantage of the critical dependency many cancers including renal cell carcinoma, or RCC, have on the nutrient glutamine for growth and survival. We believe telaglenastat has the potential to be an important new therapeutic agent with a novel mechanism of action for the treatment of a broad range of cancers, and is the only selective allosteric glutaminase inhibitor currently in clinical trials. We retain all commercial rights to telaglenastat and have been granted a U.S. patent, which includes composition of matter coverage for telaglenastat through 2032.

We are currently developing telaglenastat in combination with standard therapies in a select set of solid tumors. Our lead development pathway is in RCC where we are evaluating telaglenastat in two randomized Phase 2 trials, including one with registrational intent. The ENTRATA trial (NCT03163667) is a Phase 2 randomized, double blind trial designed to evaluate the safety and efficacy of telaglenastat in combination with everolimus versus placebo with everolimus in patients with advanced clear cell RCC who have been treated with at least two prior lines of systemic therapy, including a VEGFR-targeted tyrosine kinase inhibitor. The primary endpoint of ENTRATA is progression-free survival, or PFS. The trial enrolled 69 patients at multiple centers in the United States. Enrollment is complete, and we plan to report efficacy and safety data from the trial in the second half of 2019.

Telaglenastat is also being investigated in the CANTATA trial (NCT03428217), which will enroll approximately 400 patients and is designed with registrational intent. It is a global, randomized, double-blind trial designed to evaluate the safety and efficacy of telaglenastat in combination with cabozantinib versus placebo with cabozantinib in patients with advanced clear cell RCC who have been treated with one or two prior lines of systemic therapy. The primary endpoint is PFS by blinded independent review, and a key secondary endpoint is overall survival. The trial is currently enrolling, and we plan to report topline efficacy and safety data in 2020.

Our product candidate, INCB001158 is an oral inhibitor of arginase, an enzyme that depletes the amino acid arginine, a key metabolic nutrient for T-cells. INCB001158 was discovered by Calithera and is being co-developed with Incyte Corporation, or Incyte, for oncology and hematology indications, and is currently being evaluated in Phase 1/2 trials as a monotherapy and in combination with other anti-cancer agents. Arginase depletes arginine, a nutrient that is critical for the activation and proliferation of the body's cancer-fighting immune cells, such as cytotoxic T-cells and natural killer (NK)-cells. In some physiological circumstances such as maternal-fetal immune tolerance, arginase-mediated depletion of arginine plays an important role in suppressing the immune system. But in many tumors, arginase-expressing myeloid cells accumulate and maintain an immunosuppressive environment, blocking the ability of T-cells and NK-cells to kill cancer cells. We have demonstrated that arginase-expressing myeloid cells can accumulate in a number of cancers, including lung, gastrointestinal, bladder, renal, squamous cell head and neck and acute myeloid leukemia. We believe that inhibitors of arginase can promote an anti-tumor immune response by restoring arginine levels, thereby allowing activation of the body's own immune cells, including cytotoxic T-cells and NK-cells. Data from the Phase 1/2 clinical trials of INCB001158 are expected to be presented at a medical meeting in the second half of 2019.

Our product candidate CB-280 is an oral arginase inhibitor for the treatment of cystic fibrosis. It is a novel oral arginase inhibitor which is solely owned by Calithera. In February, we initiated a Phase 1 trial designed to assess the safety, tolerability and pharmacokinetics of CB-280 in healthy volunteers. We anticipate completion of this study in 2019.

CB-708, an orally administered small molecule inhibitor of CD73 and our fourth compound planned to enter clinical trials, inhibits the oncometabolism target CD73. CD73 is an enzyme in the ATP adenosine metabolic pathway that plays a critical immunosuppressive role in tumors. Initiation of a Phase 1 study for CB-708 is planned for 2019.

We are a fully integrated biopharmaceutical company with expertise in biology and chemistry, and our ongoing research efforts are focused on discovering additional product candidates for the treatment of cancer and other life threatening diseases. In addition to the products described above, we are also advancing additional preclinical stage programs with a focus on oncology.

Our Strategy

Our goal is to be the leader in the discovery, development and commercialization of novel small molecule drugs to address unmet medical needs resulting from diseases affecting tumor and immune cell biology. Leveraging the potentially broad applicability of our tumor and immune metabolism expertise, our primary focus is in oncology, though we may opportunistically develop therapeutics outside of oncology where we can utilize existing expertise to treat diseases with unmet needs. The key element of our strategy are to:

- Advance and complete the clinical development of telaglenastat for RCC. We are developing telaglenastat for the treatment of RCC in combination regimens with standard therapeutics. We have completed enrollment of the ENTRATA trial, a Phase 2 randomized trial in advanced renal cell carcinoma. We are also currently enrolling the CANTATA trial, a randomized Phase 2 global study with registrational intent that investigates the efficacy and safety of telaglenastat or placebo in combination with cabozantinib, as second or third line therapy for patients with

metastatic RCC. In April 2018, telaglenastat received Fast Track designation from the FDA for the treatment of patients with metastatic RCC with telaglenastat in combination with cabozantinib, who have received one or two prior lines of therapy, including at least one vascular endothelial growth factor tyrosine kinase inhibitor or the combination of nivolumab and ipilimumab.

• Advance the clinical development of telaglenastat for the treatment of additional cancers. Mutated oncogenes can make cancer cells dependent on glutamine for growth and survival and glutaminase inhibitors have synergistic effects when combined with many cancer drugs. Through the use of clinical collaborations and investigator-sponsored exploratory studies, we are developing telaglenastat for additional oncology indications, including genetically defined sub-populations. We currently have an ongoing clinical collaboration with Bristol-Myers Squibb for the treatment of patients with several different tumor types using telaglenastat in combination with nivolumab, also known as OPDIVO®. We also have a clinical collaboration with Pfizer to evaluate Pfizer's CDK4/6 inhibitor palbociclib, also known as IBRANCE®, and the dual-mechanism poly (ADP-ribose) polymerase (PARP) inhibitor talazoparib also known as TALZENNA®, each in combination with telaglenastat.

• Advance the clinical development for INCB001158 for the treatment of cancer with our partner Incyte. INCB001158, an internally discovered molecule, is being evaluated in multiple clinical trials for the treatment of patients with solid tumors both as a monotherapy, in combination with anti-PD-1 immunotherapy, and in three chemotherapy regimens. INCB001158 is being developed as part of a collaboration and license agreement with Incyte.

• Advance the clinical development of CB-280 as a new treatment modality for cystic fibrosis. Arginase and the amino acid arginine are believed to be critical in the pathology of cystic fibrosis. Arginase impairs production of nitric oxide and generates metabolites of arginine that may impair lung function. CB-280 is an orally administered small molecule inhibitor of arginase. We have initiated a Phase 1 trial designed to assess the safety, tolerability and pharmacokinetics of CB-280 in healthy volunteers.

• Advance the clinical development of CB-708 as a new small molecule immunotherapy in the adenosine pathway for the treatment of cancer. The oncometabolism target CD73 is an enzyme that plays a critical role in the process of ATP conversion to adenosine.

• Apply our insights in tumor metabolism and immuno-oncology to discover and develop additional targets beyond our current pipeline. Our research focus has remained on metabolic enzymes, but our portfolio has diversified into the therapeutic areas of oncology, immuno-oncology and cystic fibrosis.

Our Research and Development Programs

The following table summarizes our ongoing and planned clinical trials for our lead programs. We also intend to develop additional product candidates from our research and discovery efforts in these fields.

The Evolution of Cancer Therapeutic Agents

Cancer is characterized by the uncontrolled growth of aberrant cells in the body, leading to the invasion of essential organs and often death. Unlike normal cells, which grow only in response to carefully regulated signals from the body, cancer cells are able to proliferate largely without external signals. Cancer cells have gained this ability as the result of genetic alterations that change protein expression or function. Invasive tumors, also known as metastatic tumors, which are the greatest threat to patients, typically have multiple mutations, deletions or amplifications of genes encoding key proteins that regulate cell growth. These alterations allow the cancer cell to grow, invade other tissues, and avoid recognition and destruction by the body's immune system.

Initially, the pharmacological treatment of cancer utilized non-specific cytotoxic agents that targeted all rapidly dividing cells, including normal cells. These non-specific cytotoxic agents have anti-tumor effects but their use is often limited by severe toxicities. As the understanding of the proteins and pathways that enable cancer cells to thrive has evolved, newer more targeted agents have been developed that block specific proteins that are activated in cancer cells.

Tumor metabolism and tumor immunology represent two emerging fields for the development of therapeutics that can address the challenges presented in treating cancers with multiple mutations or with mutations that are difficult to inhibit. Certain fundamental changes in the metabolic pathways of cancer cells are observed in many cancer types with different mutational backgrounds. Emerging therapeutic agents that can take advantage of these changes in metabolism have the potential to act broadly against many cancers. Similarly, genetically diverse tumor types have developed mechanisms to escape destruction by the body's immune system. We believe additional opportunities exist to develop novel therapeutics that can further enhance the cancer-fighting ability of the immune system, either as single agents, or in combination with approved therapeutics.

Rationale for Targeting Tumor Cell Metabolism

Cancer cells acquire the ability to grow rapidly and spread to new sites in the body by accumulating genetic alterations in important genes that control growth and survival. These same genetic changes also result in altered metabolic pathways within the cancer cells that fuel the high demand for energy and the production of new proteins, lipids, RNA and DNA needed for rapid proliferation. We and others have observed that many types of cancer cells develop a unique dependence on specific metabolic pathways upon which normal cells are less reliant. Accordingly, when these metabolic pathways are blocked, cancer cells are essentially starved of critical nutrients and stop growing or die, whereas normal cells are largely unaffected.

Rewired metabolic signaling pathways are a hallmark of many cancers. Targeting oncometabolism is a novel therapeutic approach to blocking cancer growth. Many cancer cells excessively consume nutrients, such as glutamine and glucose, to meet increased metabolic demands. Glutamine is a critical fuel for the metabolic demands of cancer cell growth. Glutaminase catalyzes the conversion of glutamine to glutamate and is frequently overexpressed in cancer. Cancer cells can become dependent on glutaminase in response to oncogene signaling and thus glutaminase is emerging as a novel target for cancer therapeutics.

Our Programs

Our Glutaminase Program

It has been known for more than 50 years that most cancer cells require glutamine to thrive. Glutaminase converts glutamine to glutamate, an amino acid required by cells for several essential functions. Many cancer cells, unlike normal cells, are dependent upon the enzyme glutaminase to make sufficient amounts of glutamate to grow and survive. This higher dependency upon the glutaminase pathway is likely due to an alternate use of the tricarboxylic acid cycle (also known as TCA or Krebs cycle) in cancer cells to generate energy and metabolic intermediates required for cell growth and survival. Glutaminase inhibition in tumors implanted in animals leads to tumor shrinkage and marked reduction in downstream metabolic intermediates including amino acids, nucleotides and glutathione, whereas these metabolic intermediates are largely unaffected in normal tissues. This supports our hypothesis that glutaminase inhibitors can selectively target tumors. When combined with therapeutic agents that target growth factor receptors and downstream signaling pathways known to increase glucose utilization in tumor cells, it is possible to block glucose and glutamine utilization by tumor cells, which we believe can provide an enhanced therapeutic benefit.

During an immune response, T-cell metabolism partially resembles the metabolism of cancer cells, and the need for both glucose and glutamine increases markedly. The expression of the checkpoint PD-1 on T-cells following activation inhibits the uptake and utilization of glucose, and blocks rapid proliferation. The checkpoint inhibitors that block PD-L1 or PD-1 restore the ability of T-cells to utilize glucose. However, T-cells require both glucose and glutamine to proliferate. We believe that the accumulation of glutamine through the inhibition of tumor cell glutaminase has the indirect effect of supplying T-cells and NK cells with a needed nutrient. Since T-cell proliferation, unlike cancer cell proliferation, is not strongly inhibited by telaglenastat, we believe that combining telaglenastat with

inhibitors of the PD-L1/PD-1 checkpoint will support the activation and expansion of cytotoxic immune cells in the nutrient-deprived tumor microenvironment and enhance anti-tumor responses.

Our Glutaminase Inhibitor Telaglenastat (CB-839)

Our lead product candidate, telaglenastat, takes advantage of the pronounced dependency many cancers have on the nutrient glutamine for growth and survival. Telaglenastat is a novel, selective glutaminase inhibitor that blocks glutamine consumption in tumor cells and demonstrates synergistic antitumor effects with multiple anticancer therapies in preclinical studies.

Many tumor cells depend on this metabolic pathway for growth and survival. Telaglenastat targets an allosteric binding site that is highly specific for glutaminase. Inhibition of glutaminase prevents glutamine from serving its critical roles in nucleic acid synthesis, DNA repair, cell cycle progression, energy generation, and protection from oxidative stress. Telaglenastat produces synergistic anti-tumor effects in preclinical studies when used in combination with multiple classes of anti-cancer therapies. Because telaglenastat has multiple mechanisms for impacting cellular metabolism, it has anti-tumor effects on a number of different tumor types when combined with a variety of different agents, including tyrosine kinase inhibitors, mTOR inhibitors, taxanes, immune checkpoint inhibitors, CDK4/6 inhibitors and PARP inhibitors.

Telaglenastat binds to a site on glutaminase distinct from the glutamine-binding active site, making it a highly selective and unique allosteric inhibitor. Telaglenastat is well-tolerated in part because of this selectivity. We believe telaglenastat has the potential to be an important new therapeutic agent with a novel mechanism of action for the treatment of a broad range of cancers, and is the only selective allosteric glutaminase inhibitor currently in clinical trials. We retain all commercial rights to telaglenastat and have been granted a U.S. patent, which provides composition of matter coverage for telaglenastat through 2032, as well as patents applied for/issued in other territories.

In February 2014, we initiated three Phase 1 clinical trials to assess the safety and tolerability of telaglenastat in patients with solid and hematological tumors. Most patients in these trials were relapsed and refractory to multiple approved therapies. These studies showed that drug concentration generally increases with dose, and increasing concentration of telaglenastat in blood correlates with increasing inhibition of glutaminase in blood platelets and tumors. The half-life of telaglenastat in blood is approximately four hours. Telaglenastat is dosed with food on a twice-daily regimen.

Telaglenastat has been generally well-tolerated using doses up to 1000 mg administered either twice or three times daily. The primary treatment-related toxicities with monotherapy telaglenastat observed to date include fatigue, gastrointestinal events (nausea, vomiting, and constipation), elevations in liver function tests, or LFTs, and photophobia. The majority of these adverse events have been mild to moderate (Grade 1/2) in severity.

Evaluation of telaglenastat in renal cell carcinoma (RCC)

New therapeutic options are needed to slow disease progression and improve overall survival in patients with advanced RCC. Metastatic RCC is associated with a poor quality of life and high mortality, with a 5-year survival rate of 12%. According to the American Cancer Society, 65,340 new cases of RCC were estimated to be diagnosed in the United States in 2018. It is the sixth most common cancer diagnosed in men. Approximately 16% of patients with RCC present with metastatic disease; however, up to 40% of patients develop metastatic disease after primary surgical treatment of localized RCC. New agents with novel mechanisms of action are needed despite recent advances with antiangiogenic and immune therapies.

RCC commonly exhibits genetically-driven metabolic alterations that increase their dependence on glutamine, which creates opportunities to develop novel agents targeting glutamine metabolism that could improve patient outcomes. Clear cell RCC, the most common RCC subtype comprising 75-85% of patients, is closely associated with inactivation of the VHL tumor suppressor gene, which can lead to activation of hypoxia-related pathways through HIFs (hypoxia-inducible transcriptional factors). VHL-deficient cells and tumors are dependent on glutamine because of a HIF-mediated loss of ability to make fatty acids from glucose, which is a characteristic that confers sensitivity to glutamine depletion. Targeted therapies that deprive VHL-deficient RCC cells of glutamine could prove beneficial in the treatment of VHL-deficient tumors. Accordingly, we believe that most patients with RCC tumors will have increased susceptibility to inhibition of glutaminase with telaglenastat.

Telaglenastat was evaluated as a monotherapy in an RCC cohort in the dose expansion stage of our solid tumor Phase 1 clinical trial. Twenty-one efficacy-evaluable RCC patients were treated with single agent telaglenastat on the BID (twice-daily) dosing schedule. One patient achieved a partial response with a substantial decrease in target lesions (32%), including a dramatic improvement in the patient's extensive lymphadenopathy. A total of 10 patients showed stable disease or better.

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In January 2018, we presented an update to the Phase 1b trial of telaglenastat in combination with everolimus in RCC. Twenty-four patients, with a median of 3 prior therapies, were treated and evaluable for response. Ninety-two percent (92%) of patients experienced control of their disease, including one patient with a partial response and 21 patients with stable disease. The median progression free survival was 5.8 months, which compares favorably to historical data in this patient population. Patients were administered telaglenastat in oral doses that ranged from 400-800 mg twice a day in combination with a fixed oral dose of everolimus at 10 mg once a day. The addition of telaglenastat to full-dose everolimus has been well tolerated, with a similar safety profile to the known profile of everolimus alone.

In February, we presented an update to the Phase 1b trial of telaglenastat in combination with cabozantinib in RCC. Among 12 evaluable late-line RCC patients treated with telaglenastat and cabozantinib, including 10 clear cell patients and two papillary patients, 100% of evaluable patients experienced tumor shrinkage and had disease control. The response rate was 50% in the clear cell patient population, which compares favorably to historical data with cabozantinib monotherapy in which the overall response rate was 17% in Exelixis' METEOR trial. Patients enrolled in this trial had advanced or metastatic disease and had received a median of three prior treatments, which included tyrosine kinase inhibitors, mTOR inhibitors, and immune checkpoint inhibitors. Patients were administered telaglenastat in oral doses that ranged from 600-800 mg twice a day in combination with a fixed oral dose of cabozantinib at 60 mg once a day.

On the basis of the efficacy and safety data presented, we are enrolling two Phase 2 randomized clinical trials of telaglenastat for the treatment of RCC. The ENTRATA trial (NCT03163667) is a Phase 2 randomized, double blind trial designed to evaluate the safety and efficacy of telaglenastat in combination with everolimus versus placebo with everolimus in patients with advanced clear cell RCC who have been treated with at least two prior lines of systemic therapy, including a VEGFR-targeted tyrosine kinase inhibitor. Patients are randomized in a 2:1 ratio. The trial opened for enrollment in August 2017 and completed enrollment in January 2019. The trial enrolled 69 patients at multiple centers in the United States. The primary endpoint of ENTRATA is progression-free survival (PFS). We plan to report efficacy and safety data from the trial in the second half of 2019.

Telaglenastat is also being investigated in the CANTATA trial (NCT03428217), which will enroll approximately 400 patients and is designed with registrational intent. It is a global, randomized, double-blind trial designed to evaluate the safety and efficacy of telaglenastat in combination with cabozantinib versus placebo with cabozantinib in patients with advanced clear cell RCC who have been treated with one or two prior lines of systemic therapy. The primary endpoint is PFS by blinded independent review, and a key secondary endpoint is overall survival. Patients will be stratified by International Metastatic Renal Cell Carcinoma Database Consortium, or IMDC, risk category and prior treatment with anti-PD(L)1 therapy. The study has 85% power to show a 31% improvement in progression free survival. In support of the CANTATA trial, Exelixis, Inc. has entered into a material supply agreement with us for cabozantinib. The FDA has granted Fast Track designation to telaglenastat in combination with cabozantinib, for the treatment of patients with metastatic RCC who have received one or two prior lines of therapy, including at least one vascular endothelial growth factor tyrosine kinase inhibitor or the combination of nivolumab and ipilimumab. The CANTATA trial opened for enrollment in April 2018 and the primary endpoint analysis is expected in 2020.

Evaluation of telaglenastat in combination with talazoparib (Talzenna)

In October 2018, we announced a collaboration with Pfizer to evaluate the dual mechanism poly ADP-ribose polymerase (PARP) inhibitor talazoparib (Talzenna) in combination with telaglenastat for the treatment of patients with renal cell carcinoma and triple negative breast cancer. PARP inhibitors block repair of single stranded DNA breaks and are active cancer agents in patients with DNA repair mutations. Telaglenastat synergizes with PARP inhibitors to impair DNA synthesis, enhance DNA damage, and block cancer cell proliferation. The combination of telaglenastat with PARP inhibitors has demonstrated synergistic activity in a number of preclinical cancer models,

including RCC, TNBC, CRC, NSCLC, ovarian cancer and prostate cancer. There is a potential to develop the combination therapy in patients with or without DNA repair mutations. Based on these data, we will initiate a Phase 1/2 clinical trial of the combination of telaglenastat plus talazoparib in patients with RCC, and TNBC in the first quarter of 2019.

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Evaluation of telaglenastat in combination with palbociclib (Ibrance)

In October 2018, we announced a collaboration with Pfizer to evaluate the CDK4/6 inhibitor palbociclib (Ibrance) in combination with telaglenastat for the treatment of patients with KRAS mutated colorectal cancer and patients with KRAS mutated non-small cell lung cancer. Preclinical data suggest that telaglenastat, which is designed to starve tumor cells of the key nutrient glutamine, synergizes with CDK4/6 inhibitors by enhancing cell cycle arrest and blocking cancer cell proliferation. The combination of telaglenastat with CDK4/6 inhibitors has demonstrated synergistic activity in a number of preclinical cancer models, including colorectal cancer (CRC), non-small cell lung carcinoma (NSCLC), triple negative breast cancer (TNBC) and ER+ breast cancer. Based on these data, we will initiate a Phase 1/2 clinical trial of the combination of telaglenastat plus palbociclib in patients with KRAS mutated CRC and patients with KRAS mutated NSCLC in the second quarter of 2019.

Evaluation of telaglenastat in PIK3CA-mutated colorectal carcinoma (CRC)

CRC is one of the most common cancers with approximately 140,250 new cases and 50,630 deaths in the U.S. in 2018, according to the American Cancer Society. The oncogene PIK3CA, which encodes the p110 catalytic subunit of phosphatidylinositol-3-kinase, is one of the most frequently mutated oncogenes in human cancers; mutations in PIK3CA are found in approximately 10%-20% of CRC, which resulted in between 14,000 and 28,000 new cases of mutated PIK3CA CRC in the United States in 2018.

An academic research group at Case Western Reserve University demonstrated that single agent telaglenastat inhibits the growth of CRC tumors with PIK3CA mutations in immune-compromised mice, but CRC tumors with a normal PIK3CA gene were not inhibited. Remarkably, the combination of telaglenastat with 5-fluorouracil induced complete and long-lasting tumor regressions in animals bearing PIK3CA mutant CRC tumors, but not tumors with normal PIK3CA, suggesting that this combination therapy may be a unique and effective approach in the clinic.

An investigator-sponsored clinical trial was initiated by Drs. Jennifer Eads, Alok Khorana, and Neal Meropol, at the Case Western Comprehensive Cancer Center. This research is supported by a Stand Up To Cancer Colorectal Cancer Dream Team Translational Research Grant (Grant Number: SU2C-AACR-DT22-17). The Phase 1 portion of the trial is designed to determine safety and the recommended dose of the combination of telaglenastat and capecitabine in patients with advanced treatment-refractory solid tumors, while the Phase 2 portion of the trial is designed to evaluate activity of the regimen in patients with late line PIK3CA mutant colorectal cancer. As of the June 2018 data presentation, 16 patients have been enrolled, including 12 patients with CRC. CRC patients must have progressed on prior fluoropyrimidine-containing therapy. In the dose escalation phase of the trial, there were no dose limiting toxicities and telaglenastat plus capecitabine was well tolerated at the full dose of telaglenastat. The recommended Phase 2 dose for the combination is telaglenastat at 800 mg BID with capecitabine at 1000 mg/m² BID. All late-line CRC patients had progressed on at least one prior fluoropyrimidine-containing regimen. For CRC patients with PIK3CA-mutated cancer (n=7), the median PFS was 26 weeks and for patients with PIK3CA wild-type cancer (n=5) the median PFS was 16 weeks (p=0.058). These results compare favorably to historical data in third line CRC patients receiving standard of care therapies, where the median PFS is approximately 8 weeks. The Phase 2 dose expansion portion of this study in patients with PIK3CA mutant colorectal cancer is ongoing.

Evaluation of telaglenastat with nivolumab

Cell lines and tumors that are treated with telaglenastat in vitro or in vivo, respectively, have been shown to have a substantial increase in the content of glutamine. We believe that inhibition of glutaminase in the tumor results in a substantial increase in the concentration of glutamine in the tumor microenvironment and that this glutamine supports the growth and proliferation of cytotoxic T-cells and NK cells that reside within the tumor. Combination of telaglenastat with anti-PD-1 or anti-PD-L1 in mice results in a doubling of the number of animals with complete

tumor regressions.

In August 2016 we initiated a Phase 1/2 clinical trial of telaglenastat in combination with the PD-1 inhibitor nivolumab in patients with RCC, melanoma, and NSCLC. The Phase 1/2 study is designed to assess the safety, pharmacokinetics and pharmacodynamics of telaglenastat and nivolumab. A collaboration with Bristol-Myers Squibb, originally announced in December 2016 to evaluate nivolumab in combination with telaglenastat in patients with RCC, was expanded in May 2017 to include melanoma and NSCLC. In November 2017, the melanoma cohort was expanded to enroll additional patients and the collaboration was expanded such that subsequent melanoma development costs would be shared, and a joint development committee was established to guide the development and regulatory strategy of the combination therapy.

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In November 2017, we presented initial data from the ongoing study of five patient cohorts. The study enrolled three cohorts of patients who had received a checkpoint inhibitor (PD-1/PD-L1) in the most recent line of therapy. Among 16 evaluable melanoma patients, all of whom were progressing on a checkpoint inhibitor at study entry, one patient achieved a complete response and two patients achieved partial responses. The overall response rate in this cohort was 19%, and the overall disease control rate was 44%. Among six evaluable NSCLC patients, all of whom were progressing on a checkpoint inhibitor at study entry, 67% experienced stable disease. Among eight evaluable RCC patients, 75% were progressing and 25% had stable disease at study entry. Stable disease was achieved in 75%, all of whom were progressing on a checkpoint inhibitor at study entry. The study enrolled one cohort of RCC patients who had received a checkpoint inhibitor in any prior line of therapy, but never achieved a response to checkpoint therapy. Among seven evaluable checkpoint inhibitor experienced RCC patients with a median of four prior lines of therapy, 57% experienced stable disease. The study enrolled another cohort of RCC patients who were previously treated with VEGF inhibiting therapy and were naïve to checkpoint inhibitors. Among 19 evaluable checkpoint inhibitor naïve RCC patients, four patients (21%) achieved a partial response and disease control rate was 74%. An analysis of all safety evaluable patients demonstrated that telaglenastat was well tolerated when combined with nivolumab in melanoma, RCC and NSCLC patients. During dose escalation of the combination therapy, there was one report of dose limiting Grade 3 ALT increase; however, no maximum tolerated dose was reported. The majority of adverse events reported have been mild to moderate with the most common being fatigue, nausea and photophobia. With 3.7% immune-related adverse events Grade ≥ 3 , the data suggest there was no apparent increase in the rate or severity of immune related events compared to historical rates.

Evaluation of telaglenastat in combination with paclitaxel in triple negative breast cancer (TNBC)

In July 2017, we initiated a Phase 2 trial of telaglenastat with paclitaxel in TNBC patients. Based on our preliminary Phase 2 clinical trial efficacy results and recent changes in the competitive landscape of TNBC, we do not plan to pursue further development of telaglenastat plus paclitaxel in triple negative breast cancer patients at this time. We will continue to assess the telaglenastat competitive landscape to determine if there is rationale to pursue other combinations in TNBC.

Evaluation of telaglenastat in additional indications

Telaglenastat is also the subject of a number of additional investigator-sponsored clinical trials and is available under NIH/NCI Cancer Therapy Evaluation Program (CTEP) collaborative agreement for clinical and non-clinical studies. Investigator-sponsored Phase 2 trials are ongoing and recruiting patients in patients with RAS wild-type CRC and myelodysplastic syndrome (MDS). A Phase 1 trial sponsored by CTEP of telaglenastat in combination with carfilzomib and dexamethasone for the treatment of multiple myeloma has opened recently. CTEP plans to initiate three additional Phase 1 and/or Phase 2 trials of telaglenastat for the treatment of NSCLC, soft tissue sarcoma and glioma; the study designs for these trials are currently being finalized.

Preclinical Activity of Telaglenastat

Telaglenastat is a novel, selective glutaminase inhibitor that blocks glutamine consumption in tumor cells and demonstrates synergistic antitumor effects with multiple anticancer therapies in preclinical studies. Telaglenastat targets an allosteric binding site that is highly specific for glutaminase. Inhibition of glutaminase prevents glutamine from serving its critical roles in nucleic acid synthesis, DNA repair, cell cycle progression, energy generation, and protection from oxidative stress. Single-agent telaglenastat blocks growth and survival in glutamine-dependent cancer cell lines and tumor xenograft models.

At plasma concentrations of telaglenastat of 300 nM or above, maximal effects on glutamine and glutamate levels in tumors were observed. In contrast, normal tissues in the same animals showed only small changes in the levels of

glutamine and glutamate, despite exposure to high levels of telaglenastat. We believe that normal cells and tissues can utilize other pathways to produce glutamate, whereas most tumor cells have been genetically re-wired to be highly reliant on glutaminase as their principal source of glutamate. This provides a potential explanation for why high doses of telaglenastat are well tolerated in animals.

Telaglenastat produces synergistic antitumor effects in preclinical studies when used in combination with multiple classes of standard-of-care anticancer therapies. Telaglenastat also acted synergistically when combined with drugs that target the Ras/Raf and PI3K/mTOR branches of growth factor signaling pathways. The two agents acting together have a greater effect on the growth and survival of tumor cells than either agent used separately. Telaglenastat was synergistic with the epidermal growth factor receptor, or EGFR, inhibitor erlotinib (marketed as Tarceva®) in non-small cell lung cancer, or NSCLC cells, with the multikinase inhibitors sunitinib (marketed as Sutent®), sorafenib (marketed as Nexavar®), trametinib (marketed as Mekinist®), selumetinib (in development), pazopanib (marketed as Votrient®), and cabozantinib (marketed as Cabometyx®) and the mTOR inhibitors everolimus (marketed as Afinitor®) and temsirolimus (marketed as Toricel®) in RCC, cells. We believe these synergistic activities likely result from the fact that growth factor pathways also control tumor metabolism and ultimately tumor cell dependence on glutamine and glucose.

Glutaminase inhibition blocks the formation of key metabolic intermediates needed for nucleotide synthesis in cancer cells and enhances the activity of DNA synthesis blocking agents, such as CDK4/6 inhibitors, and DNA repair inhibitors, such as PARP inhibitors. Telaglenastat is synergistic with the CDK4/6 inhibitor palbociclib in ER+, estrogen-resistant breast cancer lines, which results from enhanced cell cycle blockade. Furthermore, telaglenastat was recently shown to induce double-strand DNA breaks in tumor cells and had synergistic activity in vitro and in vivo in RCC cell lines with the PARP inhibitor olaparib+ (marketed as Lynparza®).

Inhibition of glutaminase also results in reduction in tumor pools of the antioxidant glutathione. The master transcriptional regulator NRF2 induces more than 200 genes related to antioxidant stress including genes responsible for glutathione biosynthesis. Somatic mutations in the NRF2/KEAP1 pathway are present in lung cancers, head and neck cancers, HCC and other cancer types. Lung cancer models with NRF2/KEAP1 pathway mutations showed marked sensitivity to inhibition by telaglenastat which is believed to be due to pronounced dependence on tumor cell glutathione production that is blocked by glutaminase inhibition.

In preclinical models, telaglenastat enhances the antitumor activity of immune checkpoint inhibitors by relieving nutrient competition in the tumor microenvironment, which potentially supports T-cell function. Telaglenastat also acted synergistically when combined with I-O drugs that inhibited the PD-1/PD-L1 immune cell checkpoint. Because many tumor cells consume large quantities of glutamine, an important nutrient for T-cells and NK cells, the tumor microenvironment is thought to be severely depleted of this nutrient. We believe that T-cells and NK cells benefit indirectly from treatment with telaglenastat by the increased availability of glutamine in the tumor microenvironment. Telaglenastat significantly increased the number of tumor regressions observed in syngeneic mice bearing CT-26 colorectal tumors when used in combination with an anti-PD-1 checkpoint inhibitor. Similar activity was observed when an anti-PD-L1 checkpoint inhibitor was used in combination with telaglenastat. Anti PD-1 is known to increase glucose utilization in T-cells, and we believe that telaglenastat, by blocking tumor consumption of glutamine, increases the concentration of glutamine in the tumor microenvironment to further activate and stimulate the proliferation of T-cells and NK cells.

In IND-enabling toxicity studies, telaglenastat was well tolerated, with no dose limiting toxicities observed in either study. The plasma concentration of telaglenastat measured at the highest dose in rats in these studies was greater than ten-fold above the 300 nM concentration required in mice to achieve maximal effects on glutamine and glutamate levels in tumors and suppress tumor growth. In independent studies, telaglenastat was shown to distribute broadly to all tissues except the brain, indicating that glutaminase could be strongly inhibited in normal tissues without causing any major toxicological effects.

Our Arginase Inhibitor INCB001158

Immune surveillance is the process whereby the body identifies pathogens as well as abnormal cells that are either infected with viruses or have become cancerous. Upon recognition of foreign or abnormal cells, a number of immune processes are activated to allow the body to attack and clear cells. However, excessive or inappropriate activation of the immune system can have negative consequences such as autoimmune disease, inflammation, or maternal-fetal rejection. Compensatory mechanisms have evolved to control excessive inflammatory activity by dampening the immune stimulation. Cancerous cells that successfully evade immune surveillance do so, in part, by blocking or reducing immune-stimulatory and/or enhancing immune-inhibitory activities. Immuno-oncology therapies interfere with mechanisms that tumors have used to dampen the immune response.

Tumors have evolved a number of strategies to avoid recognition and destruction by the immune system. One key mechanism is through suppression of cytotoxic T-cells that would otherwise attack and kill the cancer cells. Arginine is an amino acid that is fundamental to the function of cytotoxic T-cells. Without arginine, tumor specific cytotoxic T-cells fail to activate, proliferate, and mount an effective anti-tumor response.

In response to tumor-secreted factors, myeloid-derived suppressor cells, or MDSCs, and neutrophils accumulate in the tumor and secrete the enzyme arginase, resulting in depletion of arginine from the tumor microenvironment. Significant infiltration by arginase-expressing myeloid cells has been reported in many solid tumor types including lung cancer, colorectal esophageal, bladder, head and neck, kidney cancer, and other tumor types. We have confirmed that arginase-expressing MDSCs are found by immunohistochemistry, or IHC, in a wide range of tumor types including non-small cell lung (both adenocarcinoma and squamous types), gastrointestinal cancers and bladder cancers as shown in the diagram below. Arginase enzyme levels are elevated in the plasma of cancer patients across a wide range of malignancies. We believe that arginase inhibitors can promote an anti-tumor immune response by restoring arginine levels, thereby allowing activation of the body's cytotoxic T-cells.

INCB001158 has single agent anti-tumor activity in syngeneic mouse tumor models that has been demonstrated to act through an immune mechanism. The compound reduces the growth rate of mouse melanoma and lung tumors in immunocompetent mice when administered as a single agent. INCB001158 also enhances the activity of checkpoint inhibitors in the mouse breast cancer 4T1 model. In this model, checkpoint inhibitors including anti-PD-1 and anti-CTLA-4 have no effect even when administered together. INCB001158 has anti-tumor activity in this model when added to a combination of anti-PD-1 and anti-CTLA-4; furthermore, we observed a 75% decrease in the number of lung metastases that were observed when INCB001158 was added to this regimen.

Inhibition of tumor growth was accompanied by an increase in the local concentration of arginine, and the induction of multiple pro-inflammatory changes in the tumor microenvironment. Treatment with INCB001158 also enhanced the anti-tumor activity of adoptive T-cell therapy, checkpoint blockade and chemotherapy in animal models.

INCB001158 entered clinical trials in September 2016, and is currently being tested in a Phase 1/2 clinical trial in patients with solid tumors. The Phase 1 trial (NCT02903914) is designed to evaluate the safety and recommended Phase 2 dose of INCB001158 as a mono-therapy, and in combination with immune checkpoint therapy. We presented mono-therapy data in June 2017 at the American Society of Clinical Oncology, or ASCO, annual meeting. As of the data cut-off of April 24, 2017, a total of 17 patients with advanced solid tumors had received single agent doses ranging from 50 to 150 mg twice a day in the ongoing Phase 1 trial. INCB001158 was generally well tolerated with no drug-related serious adverse events. Treatment related adverse events were limited to one case each of Grade 1 anemia, fatigue, increased ALT and myalgia. No Grade 3 treatment-related adverse events were reported. Reversible, asymptomatic elevations of urinary orotic acid, a highly sensitive marker of urea cycle inhibition, were observed in two patients at 150 mg BID. Plasma levels of arginase were inhibited > 90% in all patients, and in 10 of 11 patients plasma arginine increased 1.5-fold or more. The pharmacokinetics support BID dosing of INCB001158, as currently tested doses continuously maintained targeted levels of arginase inhibition.

The recommended Phase 2 monotherapy dose has been selected, and we have initiated the evaluation of INCB001158 in combination with pembrolizumab (Keytruda®). Expansion cohorts of INCB001158 dosed with pembrolizumab are enrolling patients diagnosed with non-small cell lung cancer, melanoma, urothelial cell carcinoma, colorectal cancer, gastroesophageal cancer, squamous cell head and neck cancer and mesothelioma. A second clinical trial (NCT03314935) designed to evaluate INCB001158 in combination with chemotherapy opened for enrollment in November 2017. The Phase 1/2 trial in patients with solid tumors (including metastatic microsatellite stable colorectal cancer, biliary tract cancer, gastroesophageal cancer, endometrial cancer or ovarian cancer), is evaluating INCB001158 administered orally twice daily with either FOLFOX, gemcitabine/cisplatin or paclitaxel. Primary endpoints include safety and objective response rate. An additional Phase 1/2 trial is planned evaluating the safety and anti-tumor activity of INCB001158 in combination with daratumumab compared to daratumumab alone in refractory multiple myeloma patients.

In January 2017, we entered into a collaboration and license agreement, or the Incyte Collaboration Agreement, with Incyte Corporation. Under the terms of the Incyte Collaboration Agreement, we granted Incyte an exclusive, worldwide license to co-develop and co-commercialize our small molecule arginase inhibitors for hematology and oncology indications. The parties are collaborating on and co-funding the development of the licensed products, with Incyte bearing 70% and us bearing 30% of global development costs. The parties will share profits and losses in the U.S., with 60% to Incyte and 40% to us. We will have the right to co-detail the licensed products in the U.S., and Incyte will pay us tiered royalties ranging from the low to mid-teens on net sales of licensed products outside the U.S. We may opt out of our co-funding obligation, in which case the U.S. profit sharing will no longer be in effect, and Incyte will pay us tiered royalties ranging from the low to mid-double digits on net sales of licensed products both in the U.S. and outside the U.S., and additional royalties to reimburse us for previously incurred development costs.

In December 2014, we entered into an exclusive license agreement, or the Arginase License Agreement, with Mars, Inc., by and through its Mars Symbioscience division, or Symbioscience, under which we have been granted the exclusive, worldwide license rights to develop and commercialize Symbioscience's portfolio of arginase inhibitors for use in human healthcare. Under the Arginase License Agreement, we are responsible for the worldwide development and commercialization of the licensed products at our cost, are required to use commercially reasonable efforts with respect to such development and commercialization activities, and must meet certain general diligence obligations. We hold the first right to prosecute and to enforce all licensed rights under the Arginase License Agreement throughout the world, and Symbioscience will retain certain step-in enforcement rights. Under the exclusivity provisions of the Arginase License Agreement, each party agrees not to develop any other arginase inhibitors for use in human healthcare outside of the scope of the Arginase License Agreement.

Our Arginase Inhibitor CB-280

Arginase has been proposed to be critical in the pathophysiology of several non-oncology diseases, including cystic fibrosis (CF). CF patients have a mutation in the gene that encodes the cystic fibrosis transmembrane-conductance regulator, or CFTR, making them particularly susceptible to progressive loss in lung function. Airway disease in CF has a complex pathophysiology and, despite recent advances in developing therapies for CF, there still remains an unmet need. CB-280 is a potent and selective oral inhibitor of arginase. Arginase plays an important role in the pathophysiology of CF airway disease. Sputum from patients with CF has elevated arginase activity leading to diminished arginine levels. Reduced arginine is thought to exacerbate pulmonary disease in CF by impairing production of nitric oxide, leading to a diminished anti-microbial immune response and impaired airway function. It is known that airways of patients with CF have lower than normal nitric oxide (NO) production, and lower NO levels directly correlate with worsened lung function and increased colonization with pathogens, including *Pseudomonas aeruginosa*. Research in CF patients has demonstrated that increasing arginine levels can increase the production of nitric oxide and improve lung function.

We, along with our pre-clinical collaborators, have validated arginase inhibitors in mouse models of CF. Based on pre-clinical studies in a mouse model of CFTR-mutated CF, we believe that arginase inhibition can lead to reduced infection and improved lung function in CF patients. We believe these data support the clinical development of CB-280 in CF. In February, we initiated a Phase 1 trial conducted under an IND application. The first-in-human Phase 1 trial will evaluate the safety, tolerability and pharmacokinetic profile of oral CB-280 in healthy volunteers. We anticipate completion of this study in 2019.

Arginase is also thought to play an important pathophysiologic role in several other diseases, including idiopathic pulmonary fibrosis and other fibrotic diseases, primary pulmonary hypertension, acute respiratory distress syndrome, and others. Under our collaboration agreement with Incyte, we retained the sole right to develop and commercialize CB-280 in specific non-oncology rare disease indications, including CF.

Our CD73 Inhibitor CB-708

CD73 is an enzyme in the tumor microenvironment that produces adenosine, a powerful inhibitor of immune function in tumors. CD73 is expressed across a wide range of tumors and tumor infiltrating leukocytes, and often correlates with poor prognosis. Blockade of adenosine production by CD73 inhibition is expected to reverse immunosuppression in the tumor microenvironment and enhance the immune system's ability to fight the cancer.

We have developed an orally-bioavailable small molecule inhibitor of CD73, CB-708, that has anti-tumor activity in mouse syngeneic models both as monotherapy and in combination with checkpoint inhibitors as well as chemotherapy. Preclinical data has been accepted for presentation on April 2, 2019, at the 2019 American Association for Cancer Research annual meeting. We anticipate that our CD73 inhibitor will enter clinical trials in 2019.

Intellectual Property

Our commercial success depends in large part on our ability to obtain and maintain intellectual property protection for our product candidates, including telaglenastat, INCB001158, our preclinical compounds, and our core technologies. Our policy is to seek to protect our intellectual property position by, among other methods, filing U.S. and foreign patent applications related to the technology, inventions and improvements that are important to the development and implementation of our business strategy. We also rely on trade secrets, know-how and continuing technological innovation to develop and maintain our proprietary position.

We file patent applications directed to our product candidates, preclinical compounds and related technologies to establish intellectual property positions on these compounds and their uses in disease. We are seeking patent protection for the use of biomarkers to identify patients most likely to benefit from treatment with our product candidates. As of December 31, 2018, we owned six issued U.S. patents, seventeen issued foreign patents, and approximately 187 pending U.S. and foreign patent applications in the following foreign jurisdictions: Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Ecuador, the Eurasian Patent Organization, Europe, Hong Kong, India, Israel, Japan, Malaysia, Mexico, New Zealand, Peru, Philippines, Singapore, South Africa, South Korea, Sri Lanka, Taiwan, Thailand, Ukraine, Venezuela, and Vietnam. We expect that these patents and patent applications, if issued, would expire between April 2031 and June 2039.

As of December 31, 2018, the intellectual property portfolio for our glutaminase inhibitor program, which includes telaglenastat, included four issued U.S. patents, three of which expire in 2032 and the other of which expires in 2035, claiming compositions of matter for and methods of treating cancer with telaglenastat. We also have sixteen issued foreign patents, nine pending U.S. patent applications and 94 corresponding pending PCT and foreign patent applications directed to compositions of matter for telaglenastat and related chemical compounds, as well as methods of using these compounds. These pending patent applications also include two pending U.S. patent applications relating to methods for measuring biomarkers in cancer patients to identify patients suitable for treatment with glutaminase inhibitors. We expect that these patents and patent applications, if issued, would expire between November 2032 and November 2038.

The intellectual property portfolio for our arginase inhibitor program, which includes INCB001158, includes issued patents and pending patent applications that we have exclusively licensed from Symbioscience as well as issued patents and pending patent applications that we own. This portfolio includes nine issued U.S. patents, seven pending U.S. patent applications, 72 corresponding pending foreign patent applications, and 33 issued foreign patents directed to various arginase inhibitors and therapeutic methods of using the compounds. We expect that these patents and patent applications, if issued, would expire between April 2031 and May 2038.

Manufacturing

We do not own or operate, and currently have no plans to establish, any manufacturing facilities. We currently rely, and expect to continue to rely, on third parties to manufacture clinical supplies of telaglenastat, INCB001158, CB-280, and CB-708. Telaglenastat, INCB001158, CB-280 and CB-708 are organic compounds of low molecular weight. Our third-party contract manufacturers are currently producing telaglenastat, INCB001158, CB-280, and CB-708 for use in our clinical trials utilizing reliable and reproducible synthetic processes and common manufacturing techniques. We obtain our supplies from manufacturers on a purchase order basis and do not have any long-term arrangements. In addition, we do not currently have arrangements in place for bulk drug substance or drug product services of telaglenastat, INCB001158, CB-280 or CB-708. We intend to identify and qualify additional manufacturers to provide bulk drug substance and drug product services prior to submission of a new drug application to the FDA if necessary to ensure sufficient commercial quantities of telaglenastat, CB-280 and CB-708. Incyte Corporation has assumed responsibility for manufacturing of INCB001158 drug substance and drug product.

Research and Development

In the ordinary course of business, we enter into agreements with third parties, such as contract research organizations, medical institutions, clinical investigators and contract laboratories, to conduct our clinical trials and aspects of our research and preclinical testing. These third parties provide project management and monitoring services and regulatory consulting and investigative services.

Competition

The pharmaceutical and biotechnology industries are characterized by rapidly advancing technologies, intense competition and a strong emphasis on proprietary products. While we believe that our technology, development experience and scientific knowledge provide us with competitive advantages, we face potential competition from many different sources, including major pharmaceutical, specialty pharmaceutical and biotechnology companies, academic institutions and governmental agencies and public and private research institutions. Any product candidates that we successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future.

Our principal competitors in the fields of tumor immunology and/or tumor metabolism include Agios Pharmaceuticals, Inc., Arcus Biosciences, Inc., AstraZeneca plc, Boehringer Ingelheim GmbH, Bayer Pharma AG, Bristol-Myers Squibb Company, Celgene Corporation, Corvus Pharmaceuticals, Inc., CureTech Ltd., Dynavax Technologies Corp., Eisai Co., Ltd., Eli Lilly and Company, Forma Therapeutics Holdings, LLC, GlaxoSmithKline plc, Idera Pharmaceuticals, Inc., Immunomedics Inc., Incyte Corporation, iTeos Therapeutics SA, Merck & Co., Merck KGaA, Nektar Therapeutics, NewLink Genetics Corporation, Novartis International AG, Ono Pharmaceuticals Co., Ltd, Pfizer Inc, Roche Holdings AG and its subsidiary Genentech, Inc., Sprint Bioscience AB, Takeda Pharmaceutical Co., Ltd, and TG Therapeutics, Inc.

Our primary competitors in the field of Cystic Fibrosis include AbbVie, Inc., AIT Therapeutics, Inc., Corbus Pharmaceuticals, Inc., Flatley Discovery Lab, LLC, Galapagos NV, Novartis AG, Novoteris, LLC, Proteostatis Therapeutics, Inc., ProQR Therapeutics NV, Translate Bio, Inc., and Vertex Pharmaceuticals, Inc.

The most common methods of treating patients with cancer are surgery, radiation and drug therapy, including chemotherapy, hormone therapy, targeted drug therapy, and immunotherapy. There are a variety of available drug therapies marketed for cancer. In many cases, these drugs are administered in combination to enhance efficacy. Any product candidates we develop will compete with many existing drug and other therapies. To the extent they are ultimately used in combination with or as an adjunct to these therapies, our product candidates will not be competitive with them. Some of the currently approved drug therapies are branded and subject to patent protection, and others are available on a generic basis. Many of these approved drugs are well established therapies and are widely accepted by physicians, patients and third-party payors. In general, although there has been considerable progress over the past few decades in the treatment of cancer and the currently marketed therapies provide benefits to many patients, these therapies all are limited to some extent in their efficacy and frequency of adverse events, and none are successful in treating all patients. As a result, the level of morbidity and mortality from cancer remains high.

In addition to currently marketed therapies, there are also a number of therapeutics in late stage clinical development to treat cancer. These therapeutics in development may provide efficacy, safety, convenience and other benefits that are not provided by currently marketed therapies. As a result, they may provide significant competition for any product candidate for which we may obtain market approval.

Many of our competitors may have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining regulatory approvals and

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

The key competitive factors affecting the success of telaglenastat, INCB001158, and any future product candidates we develop, if approved, are likely to be their efficacy, safety, synergy with other approved therapies, convenience, price and the availability of reimbursement from government and other third-party payors.

Our competitors may develop and commercialize therapeutics that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than any therapeutics that we may develop. Our competitors also may obtain FDA or other regulatory approval for their therapeutics more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market. In addition, our ability to compete may be affected in many cases by insurers or other third-party and government programs seeking to control healthcare costs.

Government Regulation

Government authorities in the United States, at the federal, state and local level, and in other countries extensively regulate, among other things, the research, development, testing, manufacture, including any manufacturing changes, packaging, storage, recordkeeping, labeling, advertising, promotion, distribution, marketing, post-approval monitoring and reporting, import and export of pharmaceutical products, such as those we are developing.

United States Drug Approval Process

In the United States, the FDA regulates drugs under the Federal Food, Drug, and Cosmetic Act, or FDCA, and implements regulations. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations requires the expenditure of substantial time and financial resources. Failure to comply with the applicable United States requirements at any time during the product development process, approval process or after approval, may subject an applicant to a variety of administrative or judicial sanctions, such as the FDA's refusal to approve pending applications, withdrawal of an approval, imposition of a clinical hold, issuance of warning letters and untitled letters, product recalls, product seizures, total or partial suspension of production or distribution injunctions, fines, refusals of government contracts, restitution, disgorgement of profits or civil or criminal penalties.

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

- contract manufacturing expenses, primarily for the production or purchase of clinical supplies;
- completion of preclinical laboratory tests, animal studies and formulation studies in compliance with the FDA's good laboratory practice, or GLP, regulations;
- submission to the FDA of an IND, which must become effective before human clinical trials may begin;
- approval by an independent institutional review board, or IRB, at each clinical site before each trial may be initiated;
- performance of adequate and well-controlled human clinical trials in accordance with good clinical practices, or GCP, to establish the safety and efficacy of the proposed drug for each indication;
- submission to the FDA of a new drug application, or NDA;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities at which the product is produced to assess compliance with current good manufacturing practices, or cGMP, requirements and to assure that the facilities, methods and controls are adequate to preserve the drug's identity, strength, quality and purity; and
- FDA review and approval of the NDA.

Preclinical Studies and IND

Preclinical studies include laboratory evaluation of product chemistry and formulation, as well as in vitro and animal studies to assess the potential for adverse events, and in some cases, to establish a rationale for therapeutic use. The conduct of preclinical studies is subject to federal regulations and requirements, including GLP regulations for safety/toxicology studies. An IND sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and plans for clinical trials, among other things, to the FDA as part of an IND. Some long-term preclinical testing, such as animal tests of reproductive adverse events

and carcinogenicity, may continue after the IND is submitted. An IND automatically becomes effective 30 days after receipt by the FDA, unless before that time, the FDA raises concerns or questions related to one or more proposed clinical trials and places the trial on clinical hold. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. As a result, submission of an IND may not result in the FDA allowing clinical trials to commence.

Clinical Trials

Clinical trials involve the administration of the investigational new drug to human subjects under the supervision of qualified investigators in accordance with GCP requirements, which include, among other things, the requirement that all research subjects provide their informed consent in writing before their participation in any clinical trial. Clinical trials are conducted under written study protocols detailing, among other things, the objectives of the study, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated. A protocol for each clinical trial and any subsequent protocol amendments must be submitted to the FDA as part of the IND. In addition, an IRB at each institution participating in the clinical trial must review and approve the plan for any clinical trial before it commences at that institution, and the IRB must conduct continuing review. The IRB must review and approve, among other things, the study protocol and informed consent information to be provided to study subjects. An IRB must operate in compliance with FDA regulations. Information about certain clinical trials must be submitted within specific timeframes to the National Institutes of Health for public dissemination at www.clinicaltrials.gov. Human clinical trials are typically conducted in three sequential phases, which may overlap or be combined:

Phase 1: The drug is initially introduced into healthy human subjects or patients with the target disease or condition and tested for safety, dosage tolerance, absorption, metabolism, distribution, excretion and, if possible, to gain an early indication of its effectiveness.

Phase 2: The drug is administered to a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the product for specific targeted diseases and to determine dosage tolerance and optimal dosage.

Phase 3: The drug is administered to an expanded patient population in adequate and well-controlled clinical trials to generate sufficient data to statistically confirm the efficacy and safety of the product for approval, to establish the overall risk-benefit profile of the product and to provide adequate information for the labeling of the product.

Progress reports detailing the results of the clinical trials must be submitted at least annually to the FDA and, more frequently, if serious adverse events occur. Phase 1, Phase 2 and Phase 3 clinical trials may not be completed successfully within any specified period, or at all. Furthermore, the FDA or the sponsor may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research subjects are being exposed to an unacceptable health risk. Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution if the clinical trial is not being conducted in accordance with the IRB's requirements or if the drug has been associated with unexpected serious harm to patients.

Marketing Approval

Assuming successful completion of the required clinical testing, the results of the preclinical studies and clinical trials, together with detailed information relating to the product's chemistry, manufacture, controls and proposed labeling, among other things, are submitted to the FDA as part of an NDA requesting approval to market the product for one or more indications. Under federal law, the submission of most NDAs is additionally subject to a substantial application user fee, and the sponsor of an approved NDA is also subject to annual product and establishment user fees, which fees are typically increased annually.

The FDA conducts a preliminary review of all NDAs within the first 60 days after submission before accepting them for filing to determine whether they are sufficiently complete to permit substantive review. The FDA may request additional information rather than accept an NDA for filing. In this event, the application must be resubmitted with the additional information. The resubmitted application is also subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review. The FDA has agreed to specified performance goals in the review of NDAs. Under these goals, the FDA has committed to review most such applications for non-priority products within 10 months, and most applications for priority review products, that is, drugs that the FDA determines represent a significant improvement over existing therapy, within six months. The

review process may be extended by the FDA for three additional months to consider certain information or clarification regarding information already provided in the submission. The FDA may also refer applications for novel drugs 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. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions.

Before approving an NDA, the FDA typically will inspect the facility or facilities where the product is manufactured. The FDA will not approve an application unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. In addition, before approving an NDA, the FDA will typically inspect one or more clinical sites to assure compliance with GCP and integrity of the clinical data submitted.

The testing and approval process requires substantial time, effort and financial resources, and each may take many 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 develop our product candidates and secure necessary governmental approvals, which could delay or preclude us from marketing our products.

After the FDA's evaluation of the NDA and inspection of the manufacturing facilities, the FDA may issue an approval letter or a complete response letter. An approval letter authorizes commercial marketing of the drug with specific prescribing information for specific indications. A complete response letter generally outlines the deficiencies in the submission and may require substantial additional testing or information in order for the FDA to reconsider the application. If and when those deficiencies have been addressed to the FDA's satisfaction in a resubmission of the NDA, the FDA will issue an approval letter. The FDA has committed to reviewing such resubmissions in two or six months depending on the type of information included. Even with submission of this additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval and refuse to approve the NDA. Even if the FDA approves a product, it may limit the approved indications for use for the product, require that contraindications, warnings or precautions be included in the product labeling, require that post-approval studies, including phase 4 clinical trials, be conducted to further assess a drug's safety after approval, require testing and surveillance programs to monitor the product after commercialization, or impose other conditions, including distribution restrictions or other risk management mechanisms, including Risk Evaluation and Mitigation Strategies, or REMs, which can materially affect the potential market and profitability of the product. The FDA may prevent or limit further marketing of a product based on the results of post-market studies or surveillance programs. After approval, some types of changes to the approved product, such as adding new indications, manufacturing changes and additional labeling claims, are subject to further testing requirements and FDA review and approval.

Fast Track Designation

The FDA is required to facilitate the development and expedite the review of drugs that are intended for the treatment of a serious or life-threatening condition for which there is no effective treatment and which demonstrate the potential to address unmet medical needs for the condition. Under the Fast Track program, the sponsor of a new product candidate may request the FDA to designate the product for a specific indication as a Fast Track product concurrent with or after the submission of the IND for the product candidate. The FDA must determine if the product candidate qualifies for Fast Track designation within 60 days after receipt of the sponsor's request.

In addition to other benefits, such as the ability of the sponsor to have more frequent interactions with the FDA, the FDA may initiate review of sections of a Fast Track product's NDA before the application is complete. This rolling review is available if the applicant provides and the FDA approves a schedule for the submission of the remaining information and the applicant pays applicable user fees. However, the FDA's time period goal for reviewing a Fast Track application does not begin until the last section of the NDA is submitted. In addition, the Fast Track designation may be withdrawn by the FDA if the FDA believes that the designation is no longer supported by data emerging in the clinical trial process.

Priority Review

Under FDA policies, a product candidate may be eligible for Priority Review, or review generally within a six-month time frame from the time a complete application is accepted for filing. Products regulated by the FDA's Center for Drug Evaluation and Research, or CDER, are eligible for Priority Review if they provide a significant improvement compared to marketed products in the treatment, diagnosis or prevention of a disease. A Fast Track designated product candidate would ordinarily meet the FDA's criteria for Priority Review.

Accelerated Approval

Under the FDA's accelerated approval regulations, the FDA may approve a drug for a serious or life-threatening illness that provides meaningful therapeutic benefit to patients over existing treatments based upon a surrogate endpoint that is reasonably likely to predict clinical benefit. In clinical trials, a surrogate endpoint is a measurement of laboratory or clinical signs of a disease or condition that substitutes for a direct measurement of how a patient feels, functions or survives. Surrogate endpoints can often be measured more easily or more rapidly than clinical endpoints. A product candidate approved on this basis is subject to rigorous post-marketing compliance requirements, including the completion of Phase 4 or post-approval clinical trials to confirm the effect on the clinical endpoint. Failure to conduct required post-approval trials, or confirm a clinical benefit during post-marketing studies, would allow the FDA to withdraw the drug from the market on an expedited basis. All promotional materials for drug candidates approved under accelerated regulations are subject to prior review by the FDA.

Breakthrough Therapy Designation

A sponsor can request designation of a product candidate as a “breakthrough therapy.” A breakthrough therapy is defined as a drug that is intended, alone or in combination with one or more other drugs, to treat a serious or life-threatening disease or condition, and preliminary clinical evidence indicates that the product candidate may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. The FDA must take certain actions, such as holding timely meetings and providing advice, intended to expedite the development and review of an application for approval of a breakthrough therapy. The FDA may later decide that the product candidate no longer meets the conditions for breakthrough therapy designation.

Orphan Drugs

Under the Orphan Drug Act, the FDA may grant orphan drug designation to drugs intended to treat a rare disease or condition, which is generally defined as a disease or condition that affects fewer than 200,000 individuals in the United States. Orphan drug designation must be requested before submitting an NDA. After the FDA grants orphan drug designation, the generic identity of the drug and its potential orphan use are disclosed publicly by the FDA. Orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review and approval process. The first NDA applicant to receive FDA approval for a particular active ingredient to treat a particular disease with FDA orphan drug designation is entitled to a seven-year exclusive marketing period in the United States for that product, for that indication. During the seven-year exclusivity period, the FDA may not approve any other applications to market the same drug for the same orphan indication, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity in that it is shown to be safer, more effective or makes a major contribution to patient care. Orphan drug exclusivity does not prevent the FDA from approving a different drug for the same disease or condition, or the same drug for a different disease or condition. Among the other benefits of orphan drug designation are tax credits for certain research and a waiver of the NDA application user fee.

Pediatric Exclusivity and Pediatric Use

Under the Best Pharmaceuticals for Children Act, or BPCA, certain drugs may obtain an additional six months of exclusivity, if the sponsor submits information requested in writing by the FDA (a Written Request), relating to the use of the active moiety of the drug in children. The FDA may not issue a Written Request for studies on unapproved or approved indications or where it determines that information relating to the use of a drug in a pediatric population, or part of the pediatric population, may not produce health benefits in that population.

In addition, the Pediatric Research Equity Act, or PREA, requires a sponsor to conduct pediatric studies for most drugs and biologics, for a new active ingredient, new indication, new dosage form, new dosing regimen or new route of administration. Under PREA, original NDAs, biologics license application and supplements thereto, must contain a pediatric assessment unless the sponsor has received a deferral or waiver. Unless otherwise required by regulation, PREA does not apply to any drug for an indication where orphan designation has been granted. The required assessment must assess the safety and effectiveness of the product for the claimed indications in all relevant pediatric subpopulations and support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The sponsor or FDA may request a deferral of pediatric studies for some or all of the pediatric subpopulations. A deferral may be granted for several reasons, including a finding that the drug or biologic is ready for approval for use in adults before pediatric studies are complete or that additional safety or effectiveness data needs to be collected before the pediatric studies begin. The FDA must send a non-compliance letter to any sponsor that fails to submit the required assessment, keep a deferral current or fails to submit a request for approval of a pediatric formulation.

Overview of FDA Regulation of Companion Diagnostics

We may seek to develop in vitro companion diagnostics for use in selecting the patients that we believe will respond to our therapeutics. In August 2014, the FDA issued a guidance document that states that if safe and effective use of a therapeutic product depends on an in vitro diagnostic, then the FDA generally will require approval or clearance of the diagnostic at the same time that the FDA approves the therapeutic product. The guidance addresses issues critical to developing and obtaining approval or clearance for companion diagnostics and provides guidance as to when the FDA will require that the in vitro diagnostic, which is regulated as a medical device, and the drug be approved simultaneously. The FDA requires in vitro companion diagnostics intended to select the patients who will respond to cancer treatment to obtain approval simultaneously with approval of the drug.

Other Regulatory Requirements

Any drug manufactured or distributed by us pursuant to FDA approvals are subject to pervasive and continuing regulation by the FDA, including, among other things, requirements relating to recordkeeping, periodic reporting, product sampling and distribution, advertising and promotion and reporting of adverse experiences with the product. After approval, most changes to the approved product, such as adding new indications or other labeling claims are subject to prior FDA review and approval.

The FDA may impose a number of post-approval requirements, including REMs, as a condition of approval of an NDA. For example, the FDA may require post-marketing testing, including phase four clinical trials, and surveillance to further assess and monitor the product's safety and effectiveness after commercialization. Regulatory approval of oncology products often requires that patients in clinical trials be followed for long periods to determine the overall survival benefit of the drug.

In addition, drug manufacturers and other entities involved in the manufacture and distribution of approved drugs are required to register their establishments with the FDA and state agencies, and are subject to periodic unannounced inspections by the FDA and these state agencies for compliance with cGMP requirements. Changes to the manufacturing process are strictly regulated and often require prior FDA approval before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and impose reporting and documentation requirements upon us and any third-party manufacturers that we may decide to use. Accordingly, manufacturers must continue to expend time, money and effort in the areas of production and quality control to maintain cGMP compliance.

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

- restrictions on the marketing or manufacturing of the product, complete withdrawal of the product from the market or product recalls;
- fines, warning letters or holds on post-approval clinical trials;
- refusal of the FDA to approve pending applications or supplements to approved applications, or suspension or revocation of product license approvals;
 - product seizure or detention, or refusal to permit the import or export of products; or
- consent decrees, injunctions or the imposition of civil or criminal penalties.

The FDA strictly regulates marketing, labeling, advertising and promotion of products that are placed on the market. Drugs may be promoted only for the approved indications and in accordance with the provisions of the approved label. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off label uses, and a company that is found to have improperly promoted off label uses may be subject to significant liability.

Additional Provisions

In addition to FDA restrictions on marketing of pharmaceutical products, several other types of state and federal laws have been applied to restrict certain marketing practices in the pharmaceutical industry in recent years. These laws include, among others, anti-kickback statutes and false claims statutes. The federal healthcare program anti-kickback

statute prohibits, among other things, knowingly and willfully offering, paying, soliciting or receiving remuneration to induce or in return for purchasing, leasing, ordering or arranging for the purchase, lease or order of any healthcare item or service reimbursable under Medicare, Medicaid or other federally financed healthcare programs. This statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, purchasers and formulary managers on the other. Although there are a number of statutory exemptions and regulatory safe harbors protecting certain common activities from prosecution or other regulatory sanctions, the exemptions and safe harbors are drawn narrowly, and practices that involve remuneration intended to induce prescribing, purchases or recommendations may be subject to scrutiny if they do not qualify for an exemption or safe harbor.

Federal false claims laws prohibit any person from knowingly presenting, or causing to be presented, a false claim for payment to the federal government, or knowingly making, or causing to be made, a false statement to have a false claim paid. Recently, several pharmaceutical and other healthcare companies have been prosecuted under these laws for allegedly inflating drug prices they report to pricing services, which in turn were used by the government to set Medicare and Medicaid reimbursement rates, and for allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. In addition, certain marketing practices, including off-label promotion, may also violate false claims laws. Violations of the anti-kickback statute and false claims laws are punishable by imprisonment, criminal fines, civil monetary penalties, possible exclusion from participation in federal healthcare programs and integrity oversight and reporting obligations to resolve allegations of non-compliance with this law. The majority of states also have statutes or regulations similar to the federal anti-kickback law and false claims laws, which apply to items and services reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payor.

We may also be subject to additional federal and state laws related to physician transparency, data privacy and security, and pharmaceutical manufacturer compliance guidelines, including the federal Health Insurance Portability and Accountability Act of 1996 and the Physician Payments Sunshine Act.

Foreign Regulation

In order to market any product outside of the United States, we would need to comply with numerous and varying regulatory requirements of other countries regarding safety and efficacy and governing, among other things, clinical trials, marketing authorization, commercial sales and distribution of our products. Whether or not we obtain FDA approval for a product, we would need to obtain the necessary approvals by the comparable regulatory authorities of foreign countries before we can commence clinical trials or marketing of the product in those countries. The approval process varies from country to country and can involve additional product testing and additional administrative review periods. The time required to obtain approval in other countries might differ from and be longer than that required to obtain FDA approval. Regulatory approval in one country does not ensure regulatory approval in another, but a failure or delay in obtaining regulatory approval in one country may negatively impact the regulatory process in others.

New Legislation and Regulations

From time to time, legislation is drafted, introduced and passed in Congress that could significantly change the statutory provisions governing the testing, approval, manufacturing and marketing of products regulated by the FDA. In addition to new legislation, FDA regulations and policies are often revised or interpreted by the agency in ways that may significantly affect our business and our products. It is impossible to predict whether further legislative changes will be enacted or whether FDA regulations, guidance, policies or interpretations changed or what the effect of such changes, if any, may be.

Employees

As of December 31, 2018, we had 79 full-time employees, including 29 employees with Ph.D. or M.D. degrees. Of these full-time employees, 59 employees are engaged in research and development activities. None of our employees are represented by a labor union or covered by a collective bargaining agreement.

Facilities

We occupy approximately 54,000 square feet of office and laboratory space in South San Francisco, California. Our lease term is through January 2024, with an option to extend another two years to January 2026. Approximately 21,000 square feet of laboratory space have been leased to another biotechnology company under a sublease

agreement that expires in February 2020. We believe that our facility is sufficient to meet our current needs and that suitable additional space will be available as and when needed.

Legal Proceedings

From time to time, we may become involved in litigation relating to claims arising from the ordinary course of business. Our management believes that there are currently no claims or actions pending against us, the ultimate disposition of which could have a material adverse effect on our results of operations, financial condition or cash flows.

Available Information

We were incorporated in the State of Delaware on March 9, 2010. Our website address is www.calithera.com. Information found on, or accessible through, our website is not a part of, and is not incorporated into, this Annual Report on Form 10-K.

We file electronically with the U.S. Securities and Exchange Commission, or SEC, our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended. We make available on our website at www.calithera.com, free of charge, copies of these reports as soon as reasonably practicable after filing these reports with, or furnishing them to, the SEC.

Item 1A. Risk Factors.

Our business involves significant risks, some of which are described below. You should carefully consider these risks, in addition to the other information contained in this Annual Report on Form 10-K, including our consolidated financial statements and related notes and the section of this report titled “Management’s Discussion and Analysis of Financial Condition and Results of Operations.” The occurrence of any of the events or developments described in the following risk factors and the risks described elsewhere in this report could harm our business, financial condition, results of operations, cash flows, the trading price of our common stock and our growth prospects. Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also impair our business operations. This report on Form 10-K also contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in the forward-looking statements as a result of factors that are described in the following risk factors and the risks described elsewhere in this report.

Risks Related to Our Financial Position and Need For Additional Capital

We have incurred significant operating losses since our inception and anticipate that we will continue to incur substantial operating losses for the foreseeable future. We may never achieve or maintain profitability.

Since our inception, we have incurred significant operating losses. Our net loss was \$54.6 million, \$27.8 million, and \$38.0 million for year ended December 31, 2018, 2017 and 2016, respectively. As of December 31, 2018, we had an accumulated deficit of \$196.2 million. To date, we have financed our operations through sales of our capital stock and payments from the Incyte Collaboration Agreement. We have devoted substantially all of our financial resources and efforts to research and development. We expect that it will be many years, if ever, before we receive regulatory approval and have a product candidate ready for commercialization. We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future. Our net losses may fluctuate significantly from quarter to quarter and year to year. We anticipate that our expenses will increase substantially if and as we:

- advance further into clinical trials for our existing clinical product candidates, telaglenastat, INCB001158, and CB-280;
- continue the preclinical development of our research programs and advance candidates into clinical trials;
- identify additional product candidates and advance them into preclinical development;
- pursue regulatory approval of product candidates;
- seek marketing approvals for our product candidates that successfully complete clinical trials;
- establish a sales, marketing and distribution infrastructure to commercialize any product candidates for which we obtain marketing approval;
- maintain, expand and protect our intellectual property portfolio;
- hire additional clinical, regulatory and scientific personnel;
- add operational, financial and management information systems and personnel, including personnel to support product development;
- acquire or in-license other product candidates and technologies; and
- operate as a public company.

We have never generated any revenue from product sales and may never be profitable. To become and remain profitable, we and our collaborators must develop and eventually commercialize one or more products with significant market potential. This will require us to be successful in a range of challenging activities, including completing

preclinical studies and clinical trials of our product candidates, obtaining marketing approval for these product candidates, manufacturing, marketing and selling those product candidates for which we may obtain marketing approval, and satisfying any post-marketing requirements. We may never succeed in these activities and, even if we do, may never generate revenue that is significant or large enough to achieve profitability. Our failure to become and remain profitable would decrease the value of the company and could impair our ability to raise capital, maintain our research and development efforts, expand our business or continue our operations. A decline in the value of our company could also cause you to lose all or part of your investment.

We will need substantial additional funding. If we are unable to raise capital when needed, we would be forced to delay, reduce or eliminate our product development programs or commercialization efforts.

We expect our expenses to increase in connection with our ongoing activities, particularly as we continue the research and development of, continue and initiate clinical trials of and seek marketing approval for our product candidates, specifically telaglenastat and INCB001158, and as we become obligated to make milestone payments pursuant to our outstanding license agreements. In addition, if we obtain marketing approval for any of our product candidates, we expect to incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution of the approved product.

Our future capital requirements will depend on many factors, including:

- the scope, progress, results and costs of drug discovery, clinical development, laboratory testing and clinical trials for our product candidates, in particular telaglenastat and INCB001158;
- the costs, timing and outcome of any regulatory review of our product candidates, telaglenastat and INCB001158;
- the cost of any other product programs we pursue;
 - the costs and timing of commercialization activities, including manufacturing, marketing, sales and distribution, for any product candidates that receive marketing approval;
- the costs of preparing, filing and prosecuting patent applications, maintaining and enforcing our intellectual property rights and defending intellectual property-related claims;
- achieving the milestones set forth in the Incyte Collaboration Agreement;
- our ability to establish and maintain collaborations on favorable terms, if at all; and
- the extent to which we acquire or in-license other product candidates and technologies.

Identifying potential product candidates and conducting preclinical studies and clinical trials are time consuming, expensive and uncertain processes that take years to complete, and we may never generate the necessary data or results required to obtain marketing approval and achieve product sales for any of our current or future product candidates. In addition, our product candidates, if approved, may not achieve commercial success. Our commercial revenue, if any, will be derived from sales of products that we do not expect to be commercially available for many years, if at all.

We do not have any material committed external source of funds or other support for our development efforts other than the Incyte Collaboration Agreement for the development and commercialization of small molecule arginase inhibitors in hematology and oncology indications, including INCB001158, which agreement is terminable by Incyte for convenience or following our uncured breach. If Incyte terminates our collaboration agreement, we would need to obtain substantial additional sources of funding to develop INCB001158 as currently contemplated. If such additional funding is not available on favorable terms or at all, we may need to delay or reduce the scope of our INCB001158 development program or dedicate resources allocated to other programs to fund INCB001158. We may also need to grant rights in the United States, as well as outside the United States, to INCB001158 to one or more partners.

Accordingly, we will need substantial additional funding in connection with our continuing operations and to achieve our goals. We expect that our existing cash, cash equivalents, and investments will be sufficient to enable us to meet our current operating plan for at least the next 12 months. However, our existing cash, cash equivalents and investments may prove to be insufficient for these activities. If we are unable to raise capital when needed or on attractive terms, we would be forced to delay, reduce or eliminate our research and development programs or future commercialization efforts. Adequate additional financing may not be available to us on acceptable terms, or at all. In addition, we may seek additional financing due to favorable market conditions or strategic considerations, even if we believe we have sufficient funds for our operating plans.

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

Until such time, if ever, as we can generate substantial product revenue, we expect to finance our cash needs through a combination of equity and debt financings, as well as entering into new collaborations, strategic alliances and licensing arrangements. We do not have any committed external source of funds, other than our collaborations, which are limited in scope and duration. To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. Debt financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends, and may be secured by all or a portion of our assets. If we raise funds by entering into new collaborations, strategic alliances or licensing arrangements in the future with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or to grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings or through collaborations, strategic alliances or licensing arrangements 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.

Our short operating history may make it difficult for you to evaluate the success of our business to date and to assess our future viability.

We were founded in March 2010 and our operations to date have been limited to organizing and staffing our company, business planning, raising capital, developing our technology, identifying potential product candidates, undertaking preclinical studies and commencing Phase 1 and 2 clinical trials of our product candidates. CB-280, INCB001158, and telaglenastat are currently being evaluated in Phase 1, Phase 1/2, and Phase 2 clinical trials, respectively. All of our other programs are in research and preclinical development. We have not yet demonstrated our ability to successfully complete any clinical trials, including large-scale, pivotal clinical trials required for regulatory approval of our product candidates, obtain marketing approvals, manufacture a commercial scale product, or arrange for a third party to do so on our behalf, or conduct sales and marketing activities necessary for successful commercialization. Typically, it takes many years to develop one new product from the time it is discovered to when it is commercially available. Consequently, any predictions made about our future success or viability may not be as accurate as they could be if we had a longer operating history or if we had product candidates in advanced clinical trials.

In addition, we may encounter unforeseen expenses, difficulties, complications, delays and other known and unknown factors that may alter or delay our plans. We will need to transition from a company with a research focus to a company capable of supporting development activities and, if a product candidate is approved, a company with commercial activities. We may not be successful in any step in such a transition.

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

The U.S. government recently enacted comprehensive tax legislation that includes significant changes to the taxation of business entities. These changes include, among others, (i) a permanent reduction to the corporate income tax rate, (ii) a partial limitation on the deductibility of business interest expense, (iii) a shift of the U.S. taxation of multinational corporations from a tax on worldwide income to a territorial system (along with certain rules designed to prevent erosion of the U.S. income tax base) and (iv) a one-time tax on accumulated offshore earnings held in cash and illiquid assets, with the latter taxed at a lower rate. Notwithstanding the reduction in the corporate income tax rate, the overall impact of this tax reform is uncertain, and our business and financial condition could be adversely affected.

Risks Related to Drug Discovery, Development and Commercialization

Our approach to the discovery and development of product candidates that target tumor metabolism and tumor immunology is unproven and may never lead to marketable products.

Our scientific approach focuses on using our understanding of cellular metabolic pathways and the role of glutaminase in these pathways, as well as the role of arginase in the anti-tumor immune response, to identify molecules that are potentially promising as therapies for cancer indications. Any product candidates we develop may not effectively modulate metabolic or immunology pathways. The scientific evidence to support the feasibility of developing product candidates based on inhibiting tumor metabolism or impacting the anti-tumor immune response are both preliminary and limited. Although preclinical studies suggest that inhibiting glutaminase can suppress the growth of certain cancer cells, to date no company has translated this mechanism into a drug that has received marketing approval. Even if we are able to develop a product candidate in preclinical studies, we may not succeed in demonstrating the safety and efficacy of the product candidate in human clinical trials. Our expertise in cellular metabolic pathways, the role of glutaminase in these pathways, and the role of arginase in the anti-tumor immune response may not result in the discovery and development of commercially viable products to treat cancer.

We are very early in our development efforts, which may not be successful.

We have invested a significant portion of our efforts and financial resources in the identification of our most advanced product candidates, telaglenastat and INCB001158, which are being evaluated in Phase 2 and Phase 1/2 clinical trials, respectively. We have entered into the Incyte Collaboration Agreement for the development and commercialization of INCB001158. Pursuant to our agreement, we collaborate on and co-fund the development of INCB001158 for hematology and oncology indications, and, unless we opt out of our co-funding obligation, Incyte will fund 70% of global development costs and we will be responsible for the remaining 30%. All of our other programs are in research and preclinical development. It is also too early in our development efforts to determine whether our product candidates will demonstrate single-agent activity or will be developed for use in combination with other approved therapies, or both. As a result, the timing and costs of the regulatory paths we will follow and marketing approvals remain uncertain. Our ability to generate product revenue, which we do not expect will occur for many years, if ever, will depend heavily on the successful development and eventual commercialization of telaglenastat and INCB001158. The success of telaglenastat, INCB001158 and any other product candidates we may develop will depend on many factors, including the following:

- successful enrollment in, and completion of, clinical trials;
- demonstrating safety and efficacy;
- receipt of marketing approvals from applicable regulatory authorities;
- establishing commercial manufacturing capabilities or making arrangements with third-party manufacturers;
- obtaining and maintaining patent and trade secret protection and non-patent exclusivity for our product candidates;
- launching commercial sales of the product candidates, if and when approved, whether alone or selectively in collaboration with others;
- our ability to successfully develop and commercialize small molecule arginase inhibitors, including INCB001158 with Incyte;
- acceptance of the product candidates, if and when approved, by patients, the medical community and third-party payors;
- effectively competing with other therapies;
- a continued acceptable safety profile of the products following approval;
- enforcing and defending intellectual property rights and claims; and
- other legal, regulatory, compliance and fraud and abuse matters.

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

We may not be successful in our efforts to identify or discover potential product candidates.

Our drug discovery efforts may not be successful in identifying compounds that are useful in treating cancer. Our research programs may initially show promise in identifying potential product candidates, yet fail to yield product candidates for clinical development for a number of reasons. In particular, our research methodology used may not be successful in identifying compounds with sufficient potency or bioavailability to be potential product candidates. In addition, our potential product candidates may, on further study, be shown to have harmful side effects or other negative characteristics.

Research programs to identify new product candidates require substantial technical, financial and human resources. We may choose to focus our efforts and resources on potential product candidates that ultimately prove to be unsuccessful. If we are unable to identify suitable compounds for preclinical and clinical development, we will not be able to generate product revenue, which would harm our financial position and adversely impact our stock price.

If clinical trials of our product candidates fail to demonstrate safety and efficacy to the satisfaction of regulatory authorities or do not otherwise produce 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 must complete preclinical development and in the case of INCB001158, together with Incyte, then conduct extensive clinical trials to demonstrate the safety and efficacy of our product candidates in humans. Clinical testing is expensive, difficult to design and implement, can take many years to complete and is uncertain as to outcome. A failure of one or more clinical trials could occur at any stage of testing. The outcome of preclinical testing and early clinical trials may not be predictive of the success of later clinical trials, and interim results of a particular clinical trial do not necessarily predict final results of that trial.

Moreover, preclinical and clinical data are often susceptible to multiple interpretations and analyses. Many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval of their products.

We may experience numerous unforeseen events during, or as a result of, preclinical testing or clinical trials that could delay or prevent our ability to receive marketing approval or commercialize our product candidates, including that:

- regulators or institutional review boards may not authorize us or our investigators to commence a clinical trial or conduct a clinical trial at a prospective trial site;
- we may have delays in reaching or fail to reach agreement on acceptable clinical trial contracts or clinical trial protocols with prospective trial sites;
- clinical trials of our product candidates may produce negative or inconclusive results, and we may decide, or regulators may require us, to conduct additional clinical trials or abandon product development programs;
- the number of patients required for clinical trials of our product candidates may be larger than we anticipate; enrollment in these clinical trials may be slower than we anticipate, or participants may drop out of these clinical trials at a higher rate than we anticipate;
- our third-party contractors may fail to comply with regulatory requirements or meet their contractual obligations to us in a timely manner, or at all;
- regulators or institutional review boards may require that we or our investigators suspend or terminate clinical research for various reasons, including noncompliance with regulatory requirements or a finding that the participants are being exposed to unacceptable health risks;
- the cost of clinical trials of our product candidates may be greater than we anticipate; and
- the supply or quality of our product candidates or other materials necessary to conduct clinical trials of our product candidates may be insufficient or inadequate.

If we are required to conduct additional clinical trials or other testing of our product candidates beyond those that we currently contemplate, if we are unable to successfully complete clinical trials of our product candidates or other testing, if the results of these trials or tests are not positive or are only modestly positive or if there are safety concerns, we may:

- be delayed in obtaining marketing approval for our product candidates;
- not obtain marketing approval at all;
- obtain approval for indications or patient populations that are not as broad as intended or desired;
- obtain approval with labeling that includes significant use or distribution restrictions or safety warnings, including boxed warnings;
- be subject to additional post-marketing testing requirements; or
- have the product removed from the market after obtaining marketing approval.

Product development costs will also increase if we experience delays in testing or in receiving marketing approvals. We do not know whether any clinical trials will begin as planned, will need to be restructured or will be completed on schedule, or at all. Significant clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize our product candidates, could allow our competitors to bring products to market before we do, and could impair our ability to successfully commercialize our product candidates, any of which may harm our business and results of operations.

If we experience delays or difficulties in enrolling patients in clinical trials, our receipt of necessary regulatory approvals could be delayed or prevented.

We may not be able to initiate or continue clinical trials for our product candidates if we are unable to identify and enroll a sufficient number of eligible patients to participate in these trials as required by the U.S. Food and Drug Administration, or the FDA, or analogous regulatory authorities outside the United States. In addition, some of our competitors may have ongoing clinical trials for product candidates that would treat the same indications as our product candidates, and patients who would otherwise be eligible for our clinical trials may instead enroll in clinical trials of our competitors' product candidates. Patient enrollment is also affected by other factors, including:

- severity of the disease under investigation;
- availability and efficacy of approved medications for the disease under investigation;
- eligibility criteria for the trial in question;
- perceived risks and benefits of the product candidate under study;
- efforts to facilitate timely enrollment in clinical trials;
- patient referral practices of health care professionals;
- the ability to monitor patients adequately during and after treatment; and
- proximity and availability of clinical trial sites for prospective patients.

Our inability to enroll a sufficient number of patients for our clinical trials would result in significant delays or may require us to abandon one or more clinical trials altogether. Enrollment delays in our clinical trials may result in increased development costs for our product candidates, which would cause the value of our company to decline and limit our ability to obtain additional financing.

If serious adverse effects or unexpected characteristics of our product candidates are identified during development, we may need to abandon or limit our development of some or all of our product candidates.

We are currently evaluating CB-280, INCB001158, and telaglenastat in Phase 1, Phase 1/2, and Phase 2 clinical trials, respectively. All our other programs are in research and preclinical development and their risk of failure is high. It is impossible to predict when or if any of our product candidates will prove effective or safe in humans or will receive marketing approval. Adverse events or undesirable side effects caused by, or other unexpected properties of, our product candidates could cause us, any current or future collaborators, an institutional review board or regulatory authorities to interrupt, delay or halt clinical trials of one or more of our product candidates and could result in a more restrictive label, or the delay or denial of marketing approval by the FDA or comparable foreign regulatory authorities. If adverse effects were to arise in patients being treated with any of our product candidates, it could require us to halt, delay or interrupt clinical trials of such product candidate or adversely affect our ability to obtain requisite approvals to advance the development and commercialization of such product candidate. If our product candidates are associated with undesirable side effects or have characteristics that are unexpected, we may need to abandon their development or limit development to certain uses or subpopulations in which the undesirable side effects or other characteristics are less prevalent, less severe or more acceptable from a risk-benefit perspective. Many agents that initially showed promise in early stage testing for treating cancer or other diseases have later been found to cause side effects that prevented further development of the agent.

We are in early clinical trials with telaglenastat and INCB001158 and we have seen several adverse events, or AEs, deemed possibly or probably related to study drug in each of those programs. For example, in our evaluation of telaglenastat with nivolumab, during the dose escalation of the combination therapy, there was one report of dose limiting Grade 3 ALT increase. We have treated an insufficient number of patients to fully assess the safety of telaglenastat and INCB001158 and, as these trials progress, we may experience frequent or severe adverse events. Our ongoing and planned trials for telaglenastat and our and Incyte's ongoing and planned trials for INCB001158 may fail due to safety issues, and we may need to abandon development of telaglenastat or INCB001158. Our other research programs may fail due to preclinical or clinical safety issues, causing us to abandon or delay the development of a product candidate from these programs.

Results of preclinical studies and early clinical trials may not be predictive of results of future clinical trials.

The outcome of preclinical studies and early clinical trials may not be predictive of the success of later clinical trials, and interim results of clinical trials do not necessarily predict success in future clinical trials. Many companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in late-stage clinical trials after achieving positive results in earlier development, and we could face similar setbacks. The design of a clinical trial can determine whether its results will support approval of a product and flaws in the design of a clinical trial may not become apparent until the clinical trial is well advanced. We may experience delays in designing and executing clinical trials to support marketing approval. In addition, preclinical and clinical data are often susceptible to varying interpretations and analyses. Many companies that believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval for the product candidates. Even if we, or our current and future collaborators, believe that the results of clinical trials for our product candidates warrant marketing approval, the FDA or comparable foreign regulatory authorities may disagree and may not grant marketing approval of our product candidates.

In some instances, there can be significant variability in safety or efficacy results between different clinical trials of the same product candidate due to numerous factors, including changes in trial procedures set forth in protocols, differences in the size and type of the patient populations, changes in and adherence to the dosing regimen and other clinical trial protocols and the rate of dropout among clinical trial participants. If we fail to receive positive results in clinical trials of our product candidates, the development timeline and regulatory approval and commercialization prospects for our most advanced product candidates, and, correspondingly, our business and financial prospects would be negatively impacted.

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

We have limited financial and managerial resources. As a result, we may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing or other royalty arrangements, including our agreement with Incyte, in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate. In addition, under our agreement with Incyte, Incyte has the right to commercialize INCB001158 in hematology and oncology indications. If Incyte does not successfully commercialize INCB001158, we may be unable to realize the full value from our collaboration with Incyte.

Even if any of our product candidates receives marketing approval, we or others may later discover that the product is less effective than previously believed or causes undesirable side effects that were not previously identified, which could compromise our ability, or that of any future collaborators, to market the product.

Clinical trials of our product candidates are conducted in carefully defined sets of patients who have agreed to enter into clinical trials. Consequently, it is possible that our clinical trials, or those of any future collaborator, may indicate an apparent positive effect of a product candidate that is greater than the actual positive effect, if any, or alternatively fail to identify undesirable side effects. If, following approval of a product candidate, we, or others, discover that the product is less effective than previously believed or causes undesirable side effects that were not previously identified, any of the following adverse events could occur:

- regulatory authorities may withdraw their approval of the product or seize the product;
- we, or any future collaborators, may be required to recall the product, change the way the product is administered or conduct additional clinical trials;
- additional restrictions may be imposed on the marketing of, or the manufacturing processes for, the particular product;
- regulatory authorities may require the addition of labeling statements, such as a “black box” warning or a contraindication;
- we, or any future collaborators, may be required to create a Medication Guide outlining the risks of the previously unidentified side effects for distribution to patients;
- we, or any future collaborators, could be sued and held liable for harm caused to patients;

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- the product may become less competitive; and
- our reputation may suffer.

Even if any of our product candidates receive marketing approval, they may fail to achieve the degree of market acceptance by health care professionals, patients, third party payors and others in the medical community necessary for commercial success.

If any of our product candidates receive marketing approval, they may nonetheless fail to gain sufficient market acceptance by health care professionals, patients, third party payors and others in the medical community for us to achieve commercial success. For example, current cancer treatments like chemotherapy and radiation therapy for certain diseases and conditions are well established in the medical community, and doctors may continue to rely on these treatments. If our product candidates do not achieve an adequate level of acceptance, we may not generate significant product revenue to become profitable. The degree of market acceptance of our product candidates, if approved for commercial sale, will depend on a number of factors, including:

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

If, in the future, we are unable to establish sales and marketing capabilities or to selectively enter into agreements with third parties to sell and market our product candidates, we may not be successful in commercializing our product candidates if and when they are approved.

We do not have a sales or marketing infrastructure and have no experience in the sale, marketing or distribution of pharmaceutical products. To achieve commercial success for any approved product for which we retain sales and marketing responsibilities, we must either develop a sales and marketing organization or outsource these functions to other third parties. For our small molecule arginase inhibitors in hematology and oncology indications, including INCB001158, unless we establish our own sales and marketing capabilities, we will be significantly dependent on Incyte's sales and marketing infrastructure to effectively commercialize these products. In the future, we may choose to build a focused sales and marketing infrastructure to sell some of our product candidates if and when they are approved.

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

Factors that may inhibit our efforts to commercialize our product candidates on our own include:

- our inability to recruit and retain adequate numbers of effective sales and marketing personnel;
- the inability of sales personnel to obtain access to health care professionals or persuade adequate numbers of health care professionals to prescribe any future products; and
- unforeseen costs and expenses associated with creating an independent sales and marketing organization.

If we enter into arrangements with third parties to perform sales, marketing and distribution services, our product revenue or the profitability of these product revenue to us may be lower than if we were to market and sell any products that we develop ourselves. In addition, we may not be successful in entering into arrangements with third parties to sell and market our product candidates or may be unable to do so on terms that are favorable to us. We may have little control over such third parties, and any of them may fail to devote the necessary resources and attention to sell and market our products effectively. If we do not establish sales and marketing

capabilities successfully, either on our own or in collaboration with third parties, we will not be successful in commercializing our product candidates.

We face substantial competition, which may result in others discovering, developing or commercializing products before or more successfully than we do.

The development and commercialization of new drug products is highly competitive. Research and discoveries by others may result in breakthroughs which may render our products obsolete even before they generate any revenue. We face competition with respect to our current product candidates, and will face competition with respect to any product candidates that we may seek to develop or commercialize in the future, from major pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies worldwide. There are a number of large pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of products for the treatment of the cancer indications for which we are focusing our product development efforts. Some of these competitive products and therapies are based on scientific approaches that are the same as or similar to our approach and others are based on entirely different approaches. Potential competitors also include academic institutions, government agencies and other public and private research organizations that conduct research, seek patent protection and establish collaborative arrangements for research, development, manufacturing and commercialization.

We are developing our product candidates for the treatment of various cancers. There are a variety of available drug therapies marketed for cancer. In many cases, these drugs are administered in combination to enhance efficacy. Some of the currently approved drug therapies are branded and subject to patent protection, and others are available on a generic basis. Many of these approved drugs are well-established therapies and are widely accepted by health care professionals, patients and third-party payors. Insurers and other third-party payors may also encourage the use of generic products. We expect that if our product candidates are approved, they will be priced at a significant premium over competitive generic products. This may make it difficult for us to achieve our business strategy of using our product candidates in combination with existing therapies or replacing existing therapies with our product candidates.

There are also a number of product candidates in preclinical and clinical development by third parties to treat cancer by targeting cellular metabolism. Our principal competitors in the fields of tumor immunology and/or tumor metabolism include Agios Pharmaceuticals, Inc., Arcus Biosciences, Inc., AstraZeneca plc, Boehringer Ingelheim GmbH, Bayer Pharma AG, Bristol-Myers Squibb Company, Celgene Corporation, Corvus Pharmaceuticals, Inc., CureTech Ltd., Dynavax Technologies Corp., Eisai Co., Ltd., Eli Lilly and Company, Forma Therapeutics Holdings, LLC, GlaxoSmithKline plc, Idera Pharmaceuticals, Inc., Immunomedics Inc., Incyte Corporation, iTeos Therapeutics SA, Merck & Co., Merck KGaA, Nektar Therapeutics, NewLink Genetics Corporation, Novartis International AG, Ono Pharmaceuticals Co., Ltd, Pfizer Inc, Roche Holdings AG and its subsidiary Genentech, Inc., Sprint Bioscience AB, Takeda Pharmaceutical Co., Ltd, and TG Therapeutics, Inc.

Our primary competitors in the field of Cystic Fibrosis include AbbVie, Inc., AIT Therapeutics, Inc., Corbus Pharmaceuticals, Inc., Flatley Discovery Lab, LLC, Galapagos NV, Novartis AG, Novoteris, LLC, Proteostatis Therapeutics, Inc., ProQR Therapeutics NV, Translate Bio, Inc., and Vertex Pharmaceuticals, Inc.

Our competitors may develop products that are more effective, safer, more convenient or less costly than any that we are developing or that would render our product candidates obsolete or non-competitive. In addition, our competitors may discover biomarkers that more efficiently measure metabolic pathways than our methods, which may give them a competitive advantage in developing potential products. Our competitors may also obtain marketing approval from the FDA or other regulatory authorities for their products sooner 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 our competitors 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. Mergers and acquisitions in the pharmaceutical and biotechnology industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller and other early stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These third parties may compete with us in recruiting and retaining qualified scientific and management personnel, establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

Even if we are able to commercialize any product candidates, these products may become subject to unfavorable pricing regulations, third-party reimbursement practices or healthcare reform initiatives, which would harm our business.

The regulations that govern marketing approvals, pricing and reimbursement for new drugs vary widely from country to country. In the United States, new 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

marketing approval is granted. As a result, we might obtain marketing approval for a drug in a particular country, but then be subject to price regulations that delay its commercial launch, possibly for lengthy time periods, and negatively impact the revenue we are able to generate from the sale of the drug in that country. Adverse pricing limitations may hinder our ability to commercialize and generate revenue from one or more product candidates, even if our product candidates obtain marketing approval.

Our ability to commercialize any product candidates successfully also will depend in part on the extent to which reimbursement for these products and related treatments will be available from government health programs, private health insurers and other organizations. Government authorities and third-party payors, such as private health insurers and health maintenance organizations, decide which medications they will pay for and establish reimbursement levels. A significant trend in the U.S. healthcare industry and elsewhere is cost containment. Government authorities and third-party payors have attempted to control costs by limiting coverage and the amount of payment for particular medications. Increasingly, third-party payors are requiring that drug companies provide them with predetermined discounts from list prices and are challenging the prices charged for medical products. Reimbursement may not be available for any product that we commercialize and, if reimbursement is available, the level of reimbursement may not be sufficient. Reimbursement may impact the demand for, or the price of, any product candidate for which we obtain marketing approval. If reimbursement is not available or is available only to limited levels, we may not be able to successfully commercialize any product candidate for which we obtain marketing approval.

There may be significant delays in obtaining reimbursement for newly approved products, and coverage may be more limited than the purposes for which the product is approved by the FDA or similar regulatory authorities outside the United States. Moreover, eligibility for reimbursement does not imply that any product will be paid for in all cases or at a rate that covers our costs, including 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 not be made permanent. Reimbursement rates may vary according to the use of the drug and the medical circumstances under which it is used, may be based on reimbursement levels already set for lower cost products or procedures or 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. Third-party payors often rely upon Medicare coverage policies and payment limitations in setting their own reimbursement policies. Our inability to promptly obtain coverage and profitable payment rates from both government-funded programs and private payors for any approved products that we develop could have a material adverse effect on our operating results, our ability to raise capital needed to commercialize our approved products and our overall financial condition.

In addition, there has been heightened governmental scrutiny 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 and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drug products. We continue to monitor and evaluate the potential impact of these legislative actions and their effect on our business and operations.

Product liability lawsuits against us could cause us to incur substantial liabilities and could limit the commercialization of any product candidates 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 after approval. If we cannot successfully defend ourselves against claims that our product candidates caused injuries, we could incur substantial liabilities. Regardless of merit or eventual outcome, liability claims may result in:

- decreased demand for any product candidates that we may develop;
- injury to our reputation and significant negative media attention;
- withdrawal of clinical trial participants;
- significant costs to defend any related litigation;
- substantial monetary awards to trial participants or patients;
- loss of revenue; and
- the inability to commercialize any products we may develop.

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Although we maintain product liability insurance coverage in the amount of up to \$10.0 million per claim and in the aggregate, it may not be adequate to cover all liabilities that we may incur. We anticipate that we will need to increase our insurance coverage as we continue clinical trials and if we successfully commercialize any products. Insurance coverage is increasingly expensive. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liability that may arise.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could harm our business.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our operations involve the use of hazardous and flammable materials, including chemicals and biological and radioactive materials. Our operations also produce hazardous waste products. We generally contract with third parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials. In the event of contamination or injury resulting from our use of hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties.

Although we maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees in our workplace, including those resulting from the use of hazardous materials, this insurance may not provide adequate coverage against potential liabilities. We do not maintain insurance for environmental liability or toxic tort claims that may be asserted against us in connection with our storage or disposal of biological, chemical, hazardous or radioactive materials.

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

Risks Related to Our Dependence on Third Parties

We rely on third parties to conduct our clinical trials and some aspects of our research and preclinical testing and manufacture our product candidates, and those third parties may not perform satisfactorily, including failing to meet deadlines for the completion of such trials, research or testing.

We currently rely and expect to continue to rely on third parties, such as our collaborators, contract research organizations, clinical data management organizations, medical institutions and clinical investigators, to conduct our clinical trials and to conduct some aspects of our research and preclinical testing. Any of these third parties may terminate their engagements with us at any time. If these third parties do not successfully carry out their contractual duties, meet expected deadlines or conduct our clinical trials in accordance with regulatory requirements or our stated protocols, we will not be able to obtain, or may be delayed in obtaining, marketing approvals for our product candidates and will not be able to, or may be delayed in our efforts to, successfully commercialize our product candidates. Furthermore, these third parties may also have relationships with other entities, some of which may be our competitors. If we need to enter into alternative arrangements, it would delay our product development activities.

Our reliance on these third parties for research and development activities will reduce our control over these activities but will not relieve us of our responsibilities. For example, we will remain responsible for ensuring that each of our clinical trials is conducted in accordance with the general investigational plan and protocols for the trial, and that all clinical trial activities conducted by our contract research organizations follow applicable laws and regulations, and

are conducted in an ethical and compliant manner. Moreover, the FDA requires us to comply with standards, commonly referred to as Good Clinical Practices, for conducting, recording and reporting the results of clinical trials to assure that data and reported results are credible and accurate and that the rights, integrity and confidentiality of trial participants are protected. We also are required to register ongoing clinical trials and post the results of completed clinical trials on a government sponsored database, available at www.clinicaltrials.gov, within certain timeframes. Failure by us, or any of the third parties working on our behalf, to do the above can result in fines, adverse publicity and civil and criminal sanctions.

We do not have any manufacturing facilities. We currently rely, and expect to continue to rely, on third party manufacturers for the manufacture of our product candidates for preclinical studies and clinical trials and for commercial supply of any of these product candidates for which we obtain marketing approval. To date, we have obtained or plan to obtain materials for telaglenastat and INCB001158 for our current and planned clinical trials from third-party manufacturers. We have engaged third party manufacturers to obtain the active ingredient for telaglenastat and INCB001158 for pre-clinical testing and clinical trials. We do not have a long-term supply agreement with any third-party manufacturers, and we purchase our required drug supply on a purchase order basis.

We may be unable to establish agreements with third-party manufacturers or to do so on acceptable terms. Even if we are able to establish agreements with third-party manufacturers, reliance on third-party manufacturers entails additional risks, including:

- reliance on the third party for legal and regulatory compliance and quality assurance;
- the possible breach of the manufacturing agreement by the third party; and
- the possible termination or nonrenewal of the agreement by the third party at a time that is costly or inconvenient for us.

Third-party manufacturers may not be able to comply with current U.S. Good Manufacturing Practice requirements, or cGMPs, or similar legal and regulatory requirements outside the United States. Our failure, or the failure of our third-party manufacturers, to comply with applicable regulations could result in sanctions being imposed on us, including fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocation, seizures or recalls of product candidates, operating restrictions and criminal prosecutions, any of which could adversely affect supplies of our product candidates and harm our business and results of operations.

Any product that we may develop may compete with other product candidates and products for access to these manufacturing facilities. There are a limited number of manufacturers that operate under cGMPs and that might be capable of manufacturing for us.

Any performance failure on the part of our existing or future manufacturers could delay clinical development or marketing approval. We do not currently have arrangements in place for redundant supply for bulk drug substances. If any one of our current contract manufacturers cannot perform as agreed, we may be required to replace that manufacturer. Although we believe that there are several potential alternative manufacturers who could manufacture our product candidates, we may incur added costs and delays in identifying and qualifying any such replacement.

Our current and anticipated future dependence upon others for the manufacture of our product candidates or products may adversely affect our future profit margins and our ability to commercialize any product candidates that receive marketing approval on a timely and competitive basis.

We also currently rely, and expect to continue to rely, on third parties to store and distribute drug supplies for our clinical trials. Any performance failure on the part of these third parties could delay clinical development or marketing approval of our product candidates or commercialization of our drugs, producing additional losses and depriving us of potential revenue. Although we believe that there are several potential alternative third parties who could store and distribute drug supplies for our clinical trials, we may incur added costs and delays in identifying and qualifying any such replacement.

Our arginase inhibitors program in hematology and oncology indications, including INCB001158, is reliant in part on Incyte for the successful development and commercialization in a timely manner. If Incyte does not devote sufficient resources to INCB001158's development, is unsuccessful in its efforts, or chooses to terminate its agreement with us, our business, operating results and financial condition will be harmed.

We have entered into the Incyte Collaboration Agreement under which we have granted Incyte an exclusive, worldwide license to develop and commercialize small molecule arginase inhibitors for hematology and oncology indications, including INCB001158, which is currently in Phase 1/2 clinical trials.

Under the agreement, we and Incyte will jointly conduct and co-fund development of INCB001158, with Incyte leading global development activities. Unless we opt out of our co-funding obligation, Incyte will fund 70% of global development costs and we will be responsible for the remaining 30%. Should we disagree with Incyte about the clinical development or commercialization strategy, we could escalate the disagreement to our representatives on the

Joint Steering Committee for resolution. We and Incyte are obligated to use good faith efforts to resolve such disputes; however, in cases of deadlock, Incyte will have the deciding vote. If the agreement is terminated, other than as a result of our breach, with respect to one or more products or countries, all rights in the terminated products and countries revert to us. The Incyte collaboration may not be clinically or commercially successful due to a number of important factors, including the following:

Subject to the terms of our collaboration agreement, including diligence obligations, although Incyte has certain obligations to use commercially reasonable efforts to develop and commercialize INCB001158, Incyte has discretion in determining the efforts and resources that it will apply to its partnership with us. The timing and amount of any development milestones, and downstream commercial milestones and royalties that we may receive under such partnership will depend on, among other things, the efforts, allocation of resources and successful development and commercialization of INCB001158;

Incyte may select a dose for INCB001158 that does not have a favorable benefit/risk profile;

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• Incyte may terminate its partnership with us without cause and for circumstances outside of our control, which could make it difficult for us to attract new strategic partners or adversely affect how we are perceived in scientific and financial communities;

• Incyte may develop or commercialize INCB001158 in a way that exposes us to potential litigation that could jeopardize or invalidate our intellectual property rights or expose us to potential liability; and

If Incyte were to breach our collaboration agreement, we may need to enforce our rights under the agreement, which could be costly. If we were to terminate our agreement with Incyte due to Incyte's breach or if Incyte were to terminate the agreement without cause, there could be a delay in the return of our rights to INCB001158 and the development and commercialization of INCB001158 would be delayed, curtailed or terminated because we may not have sufficient financial resources or capabilities to continue development and commercialization on our own.

Incyte may enter into one or more transactions with third parties, including a merger, consolidation, reorganization, sale of substantial assets, sale of substantial stock or other change in control, which could divert the attention of its management and adversely affect Incyte's ability to retain and motivate key personnel who are important to the continued development of the small molecule arginase inhibitor program. In addition, the third party to any such transaction could reprioritize Incyte's development programs which could delay the development of our programs or cause Incyte to terminate the agreement.

We have in the past and may seek in the future to selectively establish collaborations, and, if we are unable to establish them on commercially reasonable terms, we may have to alter our development and commercialization plans.

Our drug development programs and the potential commercialization of our product candidates will require substantial additional cash to fund expenses. In addition to our collaboration with Incyte, for some of our product candidates, we may decide to collaborate with additional pharmaceutical and biotechnology companies for the development and potential commercialization of those product candidates.

We may also be restricted under existing license agreements from engaging in research and development activities or entering into future agreements on certain terms with potential collaborators. For example, pursuant to our license agreement with Symbioscience, we have agreed not to develop any other arginase inhibitors for use in human healthcare outside of the scope of that agreement. In addition, under our agreement with Incyte, we are not allowed to develop any retained arginase inhibitors (small molecule arginase inhibitors, other than INCB001158, retained by us for research and development in non-hematology/oncology indications) for any indication except specific orphan indications outside of hematology and oncology.

We face significant competition in seeking appropriate collaborators. Whether we reach a definitive agreement for a collaboration will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and the proposed collaborator's evaluation of a number of factors. Those factors may include the design or results of clinical trials, the likelihood of approval by the FDA or similar regulatory authorities outside the United States, the potential market for the subject product candidate, the costs and complexities of manufacturing and delivering such product candidate to patients, the potential of competing products, the existence of uncertainty with respect to our ownership of technology, which can exist if there is a challenge to such ownership without regard to the merits of the challenge and industry and market conditions generally. The collaborator may also consider alternative product candidates for similar indications that may be available to collaborate on and whether such a collaboration could be more attractive than the one with us for our product candidate.

Collaborations are complex and time-consuming to negotiate and document. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced

number of potential future collaborators.

If we decide to collaborate with any other third parties in connection with any of our development programs or product candidates, we may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we are unable to do so, we may have to curtail the development program or the product candidate for which we are seeking to collaborate, reduce or delay its development program or one or more of our other development programs, delay its potential commercialization or reduce the scope of any sales or marketing activities, or increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all. If we do not have sufficient funds, we may not be able to further develop our product candidates or bring them to market and generate product revenue.

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To the extent we enter into any other collaborations, we may depend on such collaborations for the development and commercialization of our product candidates. If those collaborations are not successful, we may not be able to capitalize on the market potential of our product candidates.

We may selectively seek additional third-party collaborators for the development and commercialization of our product candidates. Our current and any future collaborators for any collaboration arrangements include large and mid-size pharmaceutical companies, regional and national pharmaceutical companies and biotechnology companies. Pursuant to these arrangements and any potential future arrangements, we will have limited control over the amount and timing of resources that our collaborators dedicate to the development or commercialization of our product candidates. Our ability to generate revenue from these arrangements will depend on our collaborators' abilities to successfully perform the functions assigned to them in these arrangements.

Collaborations involving our product candidates, including our collaboration with Incyte, pose many risks to us, including that:

- Collaborators have significant discretion in determining the efforts and resources that they will apply to these collaborations;
- Collaborators may not pursue development and commercialization of our product candidates or may elect not to continue or renew development or commercialization programs based on clinical trial results, changes in the collaborator's strategic focus or available funding or external factors such as an acquisition that diverts resources or creates competing priorities;
- Collaborators may delay clinical trials, provide insufficient funding for a clinical trial program, stop a clinical trial or abandon a product candidate, repeat or conduct new clinical trials or require a new formulation of a product candidate for clinical testing;
- Collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our product candidates or products if the collaborators believe that competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive than ours;
- A collaborator with marketing and distribution rights to one or more product candidates or products may not commit sufficient resources to the marketing and distribution of such drugs;
- Collaborators may not properly maintain or defend our intellectual property rights or may use our proprietary information in such a way as to invite litigation that could jeopardize or invalidate our proprietary information or expose us to potential litigation;
 - Disputes may arise between the collaborators and us that result in the delay or termination of the research, development or commercialization of our product candidates or products or that result in costly litigation or arbitration that diverts management attention and resources;
- We may lose certain valuable rights under circumstances identified in our collaborations if we undergo a change of control;
- Collaborations may be terminated and, if terminated, may result in a need for additional capital to pursue further development or commercialization of the applicable product candidates; and
 - Collaboration agreements may not lead to development or commercialization of product candidates in the most efficient manner or at all. If a future collaborator of ours were to be involved in a business combination, the continued pursuit and emphasis on our product development or commercialization program under such collaboration could be delayed, diminished or terminated.

We have in-licensed a portfolio of arginase inhibitors as part of our efforts to develop product candidates for the arginase program, and we are substantially dependent on this in-license for that program. To the extent this in-license is terminated, our business may be harmed.

Our internal computer systems, or those used by our Clinical Research Organizations or other contractors or consultants, may fail or suffer security breaches.

Despite the implementation of security measures, our internal computer systems, and those of our Clinical Research Organizations and other third parties on which we rely, are vulnerable to damage from computer viruses and unauthorized access, malware, natural disasters, fire, terrorism, war and telecommunication, electrical failures, cyber-attacks or cyber-intrusions over the Internet, attachments to emails, persons inside our organization, or persons with access to systems inside our organization. The risk of a security breach or disruption, particularly through cyber-attacks or cyber intrusion, including by computer hackers, foreign governments, and cyber terrorists, has generally increased as the number, intensity and sophistication of attempted attacks and intrusions from around the world have increased. While we have not experienced any such material system failure or security breach to our knowledge to date, if such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our development programs and our business operations. For example, the loss of clinical trial data from completed, ongoing or future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. Likewise, we rely on third parties for the manufacture of our product candidates and to conduct clinical trials, and similar events relating to their computer systems could also have a material adverse effect on our business. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and the further development and commercialization of our future product candidates could be delayed.

Risks Related to Our Intellectual Property

Recent laws and rulings by U.S. courts make it difficult to predict how patents will be issued or enforced in our industry.

Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may have a significant impact on our ability to protect our technology and enforce our intellectual property rights. There have been numerous recent changes to the patent laws and to the rules of the United States Patent and Trademark Office, or the USPTO, which may have a significant impact on our ability to protect our technology and enforce our intellectual property rights. For example, the Leahy-Smith America Invents Act, which was signed into law in 2011, includes a transition from a “first-to-invent” system to a “first-to-file” system, and changes the way issued patents are challenged. Certain changes, such as the institution of inter partes review proceedings, came into effect on September 16, 2012. Substantive changes to patent law associated with the America Invents Act may affect our ability to obtain patents, and, if obtained, to enforce or defend them in litigation or post-grant proceedings, all of which could harm our business.

Furthermore, the patent positions of companies engaged in the development and commercialization of biologics and pharmaceuticals are particularly uncertain. Two cases involving diagnostic method claims and “gene patents” have recently been decided by the Supreme Court. On March 20, 2012, the Supreme Court issued a decision in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, or *Prometheus*, a case involving patent claims directed to measuring a metabolic product in a patient to optimize a drug dosage amount for the patient. According to the Supreme Court, the addition of well-understood, routine or conventional activity such as “administering” or “determining” steps was not enough to transform an otherwise patent ineligible natural phenomenon into patent eligible subject matter. On July 3, 2012, the USPTO issued guidance indicating that process claims directed to a law of nature, a natural phenomenon or an abstract idea that do not include additional elements or steps that integrate the natural principle into the claimed invention such that the natural principle is practically applied and the claim amounts to significantly more than the natural principle itself should be rejected as directed to non-statutory subject matter. On June 13, 2013, the Supreme Court issued its decision in *Association for Molecular Pathology v. Myriad Genetics, Inc.*,

or Myriad, a case involving patent claims held by Myriad Genetics, Inc. relating to the breast cancer susceptibility genes BRCA1 and BRCA2. Myriad held that isolated segments of naturally occurring DNA, such as the DNA constituting the BRCA1 and BRCA2 genes, is not patent eligible subject matter, but that complementary DNA, which is an artificial construct that may be created from RNA transcripts of genes, may be patent eligible.

We cannot assure you that our efforts to seek patent protection for our technology and products will not be negatively impacted by the decisions described above, rulings in other cases or changes in guidance or procedures issued by the USPTO. We cannot fully predict what impact the Supreme Court's decisions in Prometheus and Myriad may have on the ability of life science companies to obtain or enforce patents relating to their products and technologies in the future.

Moreover, although the Supreme Court has held in *Myriad* that isolated segments of naturally occurring DNA are not patent-eligible subject matter, certain third parties could allege that activities that we may undertake infringe other gene-related patent claims, and we may deem it necessary to defend ourselves against these claims by asserting non-infringement and/or invalidity positions, or pay to obtain a license to these claims. In any of the foregoing or in other situations involving third-party intellectual property rights, if we are unsuccessful in defending against claims of patent infringement, we could be forced to pay damages or be subjected to an injunction that would prevent us from utilizing the patented subject matter. Such outcomes could harm our business.

If we are alleged to infringe intellectual property rights of third parties, our business could be harmed.

Our research, development and commercialization activities may be alleged to infringe patents, trademarks or other intellectual property rights owned by other parties. Certain of our competitors and other companies in the industry have substantial patent portfolios and may attempt to use patent litigation as a means to obtain a competitive advantage. We may be a target for such litigation. Even if our pending patent applications issue, they may relate to our competitors' activities and may therefore not deter litigation against us. The risks of being involved in such litigation may also increase as we become more visible as a public company and move into new markets and applications for our product candidates. There may also be patents and patent applications that are relevant to our technologies or product candidates that are unknown to us. For example, certain relevant patent applications may have been filed but not published. If such patents exist, or if a patent issues on any of such patent applications, that patent could be asserted against us. Third parties could bring claims against us that would cause us to incur substantial expenses and, if the claims against us are successful, could cause us to pay substantial damages, including treble damages and attorneys' fees for willful infringement. The defense of such a suit could also divert the attention of our management and technical personnel. Further, if an intellectual property infringement suit were brought against us, we could be forced to stop or delay research, development or sales of the product that is the subject of the suit.

As a result of infringement claims, or to avoid potential claims, we may choose or be compelled to seek intellectual property licenses from third parties. These licenses may not be available on acceptable terms, or at all. Even if we are able to obtain a license, the license would likely obligate us to pay license fees or royalties or both, and the rights granted to us likely would be nonexclusive, which would mean that our competitors also could obtain licenses to the same intellectual property. Ultimately, we could be prevented from commercializing a product candidate and/or technology or be forced to cease some aspect of our business operations if, as a result of actual or threatened infringement claims, we are unable to enter into licenses of the relevant intellectual property on acceptable terms. Further, if we attempt to modify a product candidate and/or technology or to develop alternative methods or products in response to infringement claims or to avoid potential claims, we could incur substantial costs, encounter delays in product introductions or interruptions in sales.

We may become involved in other lawsuits to protect or enforce our patents or other intellectual property, which could be expensive and time-consuming, and an unfavorable outcome could harm our business.

In addition to the possibility of litigation relating to infringement claims asserted against us, we may become a party to other patent litigation and other proceedings, including inter partes review proceedings, post-grant review proceedings, derivation proceedings declared by the USPTO and similar proceedings in foreign countries, regarding intellectual property rights with respect to our current or future technologies or product candidates or products. The cost to us of any patent litigation or other proceeding, even if resolved in our favor, could be substantial. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their substantially greater financial resources. Patent litigation and other proceedings may also absorb significant management time. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could impair our ability to compete in the marketplace.

Competitors may infringe or otherwise violate our intellectual property, including patents that may issue to or be licensed by us. As a result, we may be required to file claims in an effort to stop third-party infringement or unauthorized use. Any such claims could provoke these parties to assert counterclaims against us, including claims alleging that we infringe their patents or other intellectual property rights. This can be expensive, particularly for a company of our size, and time-consuming, and even if we are successful, any award of monetary damages or other remedy we may receive may not be commercially valuable. In addition, in an infringement proceeding, a court may decide that our asserted intellectual property is not valid or is unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our intellectual property does not cover its technology. An adverse determination in any litigation or defense proceedings could put our intellectual property at risk of being invalidated or interpreted narrowly and could put our patent applications at risk of not issuing.

If the breadth or strength of our patent or other intellectual property rights is compromised or threatened, it could allow third parties to commercialize our technology or products or result in our inability to commercialize our technology and products without infringing third-party intellectual property rights. Further, third parties may be dissuaded from collaborating with us.

Interference or derivation proceedings brought by the USPTO or its foreign counterparts may be necessary to determine the priority of inventions with respect to our patent applications, and we may also become involved in other proceedings, such as re-examination proceedings, before the USPTO or its foreign counterparts. Due to the substantial competition in the pharmaceutical space, the number of such proceedings may increase. This could delay the prosecution of our pending patent applications or impact the validity and enforceability of any future patents that we may obtain. In addition, any such litigation, submission or proceeding may be resolved adversely to us and, even if successful, may result in substantial costs and distraction to our management.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. Moreover, intellectual property law relating to the fields in which we operate is still evolving and, consequently, patent and other intellectual property positions in our industry are subject to change and are often uncertain. We may not prevail in any of these suits or other efforts to protect our technology, and the damages or other remedies awarded, if any, may not be commercially valuable. During the course of this type of litigation, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, the market price for our common stock could be significantly harmed.

We may not be able to protect our intellectual property rights throughout the world, which could impair our competitive position.

Filing, prosecuting, defending and enforcing patents on all of our technologies, product candidates and products throughout the world would be prohibitively expensive. As a result, we seek to protect our proprietary position by filing patent applications in the United States and in select foreign jurisdictions and cannot guarantee that we will obtain the patent protection necessary to protect our competitive position in all major markets. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export infringing products to territories where we may obtain patent protection but where enforcement is not as strong as that in the United States. These products may compete with our current and future products in jurisdictions where we do not have any issued patents, and our patent claims or other intellectual property rights may not be effective or sufficient to prevent them from so competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property protection, which could make it difficult for us to stop the infringement of our patents or the marketing of competing products in violation of our proprietary rights generally. The legal systems of certain countries make it difficult or impossible to obtain patent protection for pharmaceutical products and services. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and could divert our efforts and attention from other aspects of our business.

If we are unable to protect the confidentiality of our trade secrets, our business and competitive position could be harmed.

In addition to seeking patents for some of our technologies and product candidates, 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 non-disclosure and confidentiality agreements with parties who have access to them, such as our employees, corporate collaborators, outside scientific collaborators, contract manufacturers, consultants, advisors and other third parties. We also enter into confidentiality and invention assignment agreements with our employees and consultants that obligate them to assign to us any inventions developed in the course of their work for us. However, we cannot guarantee that we have executed these agreements

with each party that may have or have had access to our trade secrets or that the agreements we have executed will provide adequate protection. Despite these efforts, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. As a result, we may be forced to bring claims against third parties, or defend claims that they bring against us, to determine ownership of what we regard as our intellectual property. Monitoring unauthorized disclosure is difficult and we do not know whether the procedures we have followed to prevent such disclosure are, or will be adequate. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, some courts inside and outside the United States may be less willing or unwilling to protect trade secrets. If any of the technology or information that we protect as trade secrets were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent them from using that technology or information to compete with us. If any of our trade secrets were to be disclosed to, or independently developed by, a competitor, our competitive position would be harmed.

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

Our trademarks or trade names may be challenged, infringed, circumvented, declared generic or determined to be infringing on other marks. As a means to enforce our trademark rights and prevent infringement, we may be required to file trademark claims against third parties or initiate trademark opposition proceedings. This can be expensive and time-consuming, particularly for a company of our size. In addition, in an infringement proceeding, a court may decide that a trademark of ours is not valid or is unenforceable, or may refuse to stop the other party from using the trademark at issue. We may not be able to protect our rights to these and other trademarks and trade names which we need to build name recognition by potential partners or customers in our markets of interest. We do not currently have any registered trademarks in the United States. Any trademark applications in the United States and in other foreign jurisdictions where we may file may not be allowed or may subsequently be opposed. In addition, other companies in the biopharmaceutical space may be using trademarks that are similar to ours and may in the future allege that our use of the trademark infringes or otherwise violates their trademarks. Over the long term, if we are unable to establish name recognition based on our trademarks and trade names, then we may not be able to compete effectively and our business may be harmed.

Third parties may assert ownership or commercial rights to inventions we develop.

Third parties may in the future make claims challenging the inventorship or ownership of our intellectual property. We have written agreements with collaborators that provide for the ownership of intellectual property arising from our collaborations. In some instances, there may not be adequate written provisions to address clearly the resolution of intellectual property rights that may arise from a collaboration. If we cannot successfully negotiate sufficient ownership and commercial rights to the inventions that result from our collaborations, or if disputes otherwise arise with respect to the intellectual property developed in the course of a collaboration, we may be limited in our ability to capitalize on the market potential of these inventions.

In addition, we may face claims by third parties that our agreements with employees, contractors or consultants obligating them to assign intellectual property to us are ineffective or are in conflict with prior or competing contractual obligations of assignment, which could result in ownership disputes regarding intellectual property we have developed or will develop and interfere with our ability to capture the commercial value of such inventions. Litigation may be necessary to resolve an ownership dispute, and if we are not successful, we may be precluded from using certain intellectual property, or may lose our exclusive rights in that intellectual property. Either outcome could have an adverse impact on our business.

Risks Related to Regulatory Approval of Our Product Candidates and Other Legal Compliance Matters

Even if we complete the necessary preclinical studies and clinical trials, the marketing approval process is expensive, time-consuming and uncertain and may prevent us from obtaining approvals for the commercialization of some or all of our product candidates. If we or our collaborators are not able to obtain, or if there are delays in obtaining, required regulatory approvals, we will not be able to commercialize, or will be delayed in commercializing, our product candidates, and our ability to generate revenue will be impaired.

Our product candidates and the activities associated with their development and commercialization, including their design, testing, manufacture, safety, efficacy, recordkeeping, labeling, storage, approval, advertising, promotion, sale and distribution, are subject to comprehensive regulation by the FDA and other regulatory agencies in the United States and by comparable authorities in other countries. Failure to obtain marketing approval for a product candidate will prevent us from commercializing the product candidate. We have not received approval to market any of our product candidates from regulatory authorities in any jurisdiction. We have only limited experience in filing and

supporting the applications necessary to gain marketing approvals and expect to rely on third-party contract research organizations to assist us in this process. Securing regulatory approval requires the submission of extensive preclinical and clinical data and supporting information to the various regulatory authorities for each therapeutic indication to establish the product candidate's safety and efficacy. Securing regulatory approval also requires the submission of information about the product manufacturing process to, and inspection of manufacturing facilities by, the relevant regulatory authority. Our product candidates may not be effective, may be only moderately effective or may prove to have undesirable or unintended side effects, toxicities or other characteristics that may preclude our obtaining marketing approval or prevent or limit commercial use.

The process of obtaining marketing approvals, both in the United States and elsewhere, is expensive, may take many years and can vary substantially based upon a variety of factors, including the type, complexity and novelty of the product candidates involved. We cannot assure you that we will ever obtain any marketing approvals in any jurisdiction. Changes in marketing approval policies during the development period, changes in or the enactment of additional statutes or regulations or changes in regulatory review for each submitted product application may cause delays in the approval or rejection of an application. The FDA and comparable authorities in other countries have substantial discretion in the approval process and may refuse to accept any application or may decide that our data is insufficient for approval and require additional preclinical or other studies, and clinical trials. In addition, varying interpretations of the data obtained from preclinical testing and clinical trials could delay, limit or prevent marketing approval of a product candidate. Additionally, any marketing approval we ultimately obtain may be limited or subject to restrictions or post-approval commitments that render the approved product not commercially viable.

Any product candidate for which we obtain marketing approval could be subject to marketing restrictions or withdrawal from the market, and we may be subject to penalties if we fail to comply with regulatory requirements or if we experience unanticipated problems with our products.

Any product candidate for which we obtain marketing approval, along with the manufacturing processes, post-approval clinical data, labeling, advertising and promotional activities for such product, will be subject to continual requirements of and review by the FDA and other regulatory authorities. These requirements include submissions of safety and other post-marketing information and reports, registration and listing requirements, cGMP requirements, quality assurance and corresponding maintenance of records and documents and requirements regarding the distribution of samples to health care professionals and recordkeeping. Even if marketing approval of a product candidate is granted, the approval may be subject to limitations on the indicated uses for which the product may be marketed or to the conditions of approval, or contain requirements for costly post-marketing testing and surveillance to monitor the safety or efficacy of the medicine. The FDA closely regulates the post approval marketing and promotion of drugs to ensure that they are marketed only for the approved indications and in accordance with the provisions of the approved labeling. The FDA imposes stringent restrictions on manufacturers' communications regarding off-label use and if we do not market our products for their approved indications, we may be subject to enforcement action for off-label marketing.

In addition, later discovery of previously unknown problems with our products, manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may result in, among other things:

- restrictions on such products, manufacturers or manufacturing processes;
- restrictions on the labeling, marketing, distribution or use of a product;
- requirements to conduct post-approval clinical trials;
- warning or untitled letters;
- withdrawal of the products from the market;
- refusal to approve pending applications or supplements to approved applications that we submit;
- recall of products;
- fines, restitution or disgorgement of profits or revenue;
- suspension or withdrawal of marketing approvals;
- refusal to permit the import or export of our products;
- product seizure; and
- injunctions or the imposition of civil or criminal penalties.

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

Healthcare providers, physicians and third-party payors 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 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 our medicines for which we obtain marketing approval. Restrictions under applicable federal and state healthcare laws and regulations include the following:

- the federal healthcare anti-kickback statute prohibits, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made under federal and state healthcare programs such as Medicare and Medicaid;
- the federal False Claims Act imposes criminal and civil penalties, including civil whistleblower or qui tam actions, 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, as amended by the Health Information Technology for Economic and Clinical Health Act, imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program and also imposes obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;
- the federal false statements statute prohibits knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statement in connection with the delivery of or payment for healthcare benefits, items or services;
- the Physician Payments Sunshine Act requires manufacturers of drugs, devices, biologics and medical supplies to report to the Department of Health and Human Services information related to physician payments and other transfers of value and physician ownership and investment interests; and
- analogous state laws and regulations, such as state anti-kickback and false claims laws, may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers, and some state laws require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government in addition to requiring drug manufacturers to report information related to payments to physicians and other health care providers or marketing expenditures.

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 may not comply with current or future statutes, regulations or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of 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, possible exclusion from government funded healthcare programs, such as Medicare and Medicaid, integrity oversight and reporting obligations to resolve allegations of non-compliance with these laws, and the curtailment or restructuring of our operations. If any of the health care professionals or other providers or entities with whom we expect to do business are found to be not in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

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

In the United States and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding 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 candidates for which we obtain marketing approval.

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003, or the Medicare Modernization Act, changed the way Medicare covers and pays for pharmaceutical products. The legislation expanded Medicare coverage for drug purchases by the elderly and introduced a new reimbursement methodology based on average sales prices for physician-administered drugs. In addition, this legislation provided authority for limiting the number of drugs that will be covered in any therapeutic class. Cost reduction initiatives and other provisions of this legislation could decrease the coverage and price that we receive for any approved products. While the Medicare Modernization Act applies only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own reimbursement rates. Therefore, any reduction in reimbursement that results from the Medicare Modernization Act may result in a similar reduction in payments from private payors.

Additionally, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively the PPACA, enacted in 2010, made a number of substantial changes in the way healthcare is financed by both governmental and private insurers. In the years since its enactment, there have been, and continue to be, significant developments in, and continued legislative activity around, attempts to repeal or repeal and replace the PPACA. Due to these efforts, there is significant uncertainty regarding the future of the PPACA.

Since January 2017, President Trump has signed two Executive Orders designed to delay the implementation of any certain provisions of the PPACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. Additionally, on January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain mandated fees under the PPACA, including the so-called “Cadillac” tax on certain high cost employer-sponsored insurance plans, the annual fee imposed on certain health insurance providers based on market share, and the medical device excise tax on non-exempt medical devices. Further, the Bipartisan Budget Act of 2018, among other things, amends the PPACA, effective January 1, 2019, to increase from 50% to 70% the point-of-sale discount that is owed by pharmaceutical manufacturers who participate in Medicare Part D and to close the coverage gap in most Medicare drug plans, commonly referred to as the “donut hole”. The Trump administration has also announced that it will discontinue the payment of cost-sharing reduction, or CSR, payments to insurance companies until Congress approves the appropriation of funds for the CSR payments. The loss of the CSR payments is expected to increase premiums on certain policies issued by qualified health plans under the PPACA. A bipartisan bill to appropriate funds for CSR payments has been introduced in the Senate, but the future of that bill is uncertain. Further, each chamber of Congress has put forth multiple bills designed to repeal or repeal and replace portions of the PPACA. Although none of these measures has been enacted by Congress to date, Congress may consider other legislation to repeal and replace elements of the PPACA. Any repeal and replace legislation may have the effect of limiting the amounts that government agencies will pay for healthcare products and services. Due to these efforts, there is significant uncertainty regarding the future of the PPACA.

Policy changes, including potential modification or repeal of all or parts of the PPACA or the implementation of new health care legislation could result in significant changes to the health care system, which may prevent us from being able to generate revenue, attain profitability or commercialize our drugs. We expect that additional state and federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand or lower pricing for our product candidates, or additional pricing pressures.

Further, there has been heightened governmental scrutiny 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 and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drug products.

We expect that healthcare reform measures that may be adopted in the future, could have a material adverse effect on our industry generally and on our ability to maintain or increase sales of any of our product candidates that we successfully commercialize.

Legislative and regulatory proposals have been made to expand post-approval requirements and restrict sales and promotional activities for pharmaceutical products. We cannot be sure whether additional legislative changes will be enacted, or whether the FDA regulations, guidance or interpretations will be changed, or what the impact of such changes on the marketing approvals of our product candidates, if any, may be. In addition, increased scrutiny by the U.S. Congress of the FDA's approval process may significantly delay or prevent marketing approval, as well as subject us to more stringent product labeling and post-marketing testing and other requirements.

Risks Related to Employee Matters and Managing Growth

Our future success depends on our ability to retain our senior management team and to attract, retain and motivate qualified personnel.

We are highly dependent upon our senior management team, as well as the other principal members of our research and development teams. All of our executive officers are employed “at will,” meaning we or they may terminate the employment relationship at any time. We do not maintain “key person” insurance for any of our executives or other employees. The loss of the services of any of these persons could impede the achievement of our research, development and commercialization objectives.

Recruiting and retaining qualified scientific, clinical, manufacturing and sales and marketing personnel will also be critical to our success. We may not be able to attract and retain these personnel on acceptable terms given the competition among numerous pharmaceutical and biotechnology companies for similar personnel. We also experience competition for the hiring of scientific and clinical personnel from universities and research institutions. In addition, we rely on consultants and advisors, including scientific and clinical advisors, to assist us in formulating our research and development and commercialization strategy. Our consultants and advisors may be employed by employers other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us.

We expect to expand our operations, and may encounter difficulties in managing our growth, which could disrupt our business.

We expect to expand the scope of our operations, particularly in the areas of drug development, regulatory affairs and sales and marketing. To manage our anticipated future growth, we must continue to implement and improve our managerial, operational and financial systems, expand our facilities and continue to recruit and train additional qualified personnel. We may not be able to effectively manage the expected expansion of our operations or recruit and train additional qualified personnel. Moreover, the expected expansion of our operations may lead to significant costs and may divert our management and business development resources. For example, our facilities expenses may increase, or decrease which will vary depending on the time and terms of any facility lease or sublease we may enter into from time to time. Any inability to manage growth could delay the execution of our business plans or disrupt our operations.

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

In the future, we may enter into transactions to acquire other businesses, products or technologies. Because we have not made any acquisitions to date, our ability to do so successfully is unproven. If we do identify suitable candidates, we may not be able to make such acquisitions on favorable terms, or at all. Any acquisitions we make may fail to strengthen our competitive position, and these transactions may be viewed negatively by customers or investors. We may decide to incur debt in connection with an acquisition or issue our common stock or other equity securities to the stockholders of the acquired company, which would reduce the percentage ownership of our existing stockholders. We could incur losses resulting from undiscovered liabilities of the acquired business that are not covered by the indemnification we may obtain from the seller. In addition, we may not be able to successfully integrate the acquired personnel, technologies and operations into our existing business in an effective, timely and non-disruptive manner. Acquisitions may also divert management attention from day-to-day responsibilities, increase our expenses and reduce our cash available for operations and other uses. We cannot predict the number, timing or size of future acquisitions or the effect that any such transactions might have on our operating results.

International expansion of our business exposes us to business, regulatory, political, operational, financial and economic risks associated with doing business in various jurisdictions globally.

Our business strategy incorporates international expansion, including establishing and maintaining relationships with service providers, distributors and manufacturers globally. Doing business internationally involves a number of risks, including:

- multiple, conflicting and changing laws and regulations such as tax laws, export and import restrictions, employment laws, anti-bribery and anti-corruption laws, regulatory requirements and other governmental approvals, permits and licenses;
- failure by us or our distributors to obtain appropriate licenses or regulatory approvals for the sale or use of our product candidates, if approved, in various countries;
- difficulties in managing foreign operations;
- financial risks, such as difficulty enforcing contracts exposure to foreign currency exchange rate fluctuations;

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- reduced protection for intellectual property rights;
- reduced protection of contractual rights in the event of bankruptcy or insolvency of the other contracting party;
- natural disasters, political and economic instability, including wars, terrorism and political unrest, outbreak of disease, boycotts, curtailment of trade and other business restrictions;
- difficulties in complying with changes in laws, regulations and costs affecting our foreign operations, including our United Kingdom, or UK, operations potentially affected by the UK exiting the European Union, or EU;
- failure to comply with foreign laws, regulations, standards and regulatory guidance governing the collection, use, disclosure, retention, security and transfer of personal data, including the European Union General Data Privacy Regulation, or GDPR, which introduces strict requirements for processing personal data of individuals within the European Union; and
 - failure to comply with the United Kingdom Bribery Act 2010, or UK Bribery Act, and similar antibribery and anticorruption laws in other jurisdictions, and the Foreign Corrupt Practices Act, including its books and records provisions and its anti-bribery provisions, including by failing to maintain accurate information and control over sales and distributors' activities.

The UK's planned withdrawal from the EU, commonly referred to as Brexit, may have a negative effect on global economic conditions, financial markets and our business.

Brexit has created significant uncertainty concerning the future relationship between the UK and the EU, particularly if the UK withdraws from the EU without a ratified withdrawal agreement in place. From a regulatory perspective, there is uncertainty about which laws and regulations will apply. A significant portion of the regulatory framework in the UK is derived from EU laws. However, it is unclear which EU laws the UK will decide to replace or replicate in connection with its withdrawal from the EU and the regulatory regime applicable to our operations may change.

A basic requirement related to the grant of a marketing authorization for a medicinal product in the EU is the requirement that the applicant be established in the EU. Following withdrawal of the UK from the EU, marketing authorizations previously granted to applicants established in the UK through the centralized, mutual recognition or decentralized procedures may no longer be valid. Moreover, depending upon the exact terms of the UK's withdrawal, there is a risk that the scope of a marketing authorization for a medicinal product granted by the European Commission pursuant to the centralized procedure, or by the competent authorities of other EU member states through the decentralized or mutual recognition procedures, would not encompass the UK. In that circumstance, a separate authorization granted by the UK competent authorities would be required to place medicinal products on the UK market.

Brexit has also given rise to calls for the governments of other EU member states to consider withdrawal from the EU. These developments, or the perception that they could occur, have had and may continue to have a material adverse effect on global economic conditions and the stability of global financial markets, including by significantly reducing global market liquidity or restricting the ability of key market participants to operate in certain financial markets.

Any of these risks, if encountered, could significantly harm our future international operations and, consequently, negatively impact our financial condition, results of operations and cash flows.

Risks Related to Our Common Stock

The trading price of our common stock is likely to be volatile, and purchasers of our common stock could incur substantial losses.

Our stock price has fluctuated in the past and is likely to be volatile in the future. The stock market in general and the market for biotechnology companies in particular have experienced extreme volatility that has often been unrelated to the operating performance of particular companies. As a result of this volatility, investors may experience losses on

their investment in our common stock. The market price for our common stock may be influenced by many factors, including:

• the success of competitive products or technologies;

- regulatory actions with respect to our product candidates or our competitors' product and product candidates;

• announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures, collaborations or capital commitments;

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- results of clinical trials of our product candidates or those of our competitors;
- regulatory or legal developments in the United States and other countries;
- developments or disputes concerning patent applications, issued patents or other proprietary rights;
- the recruitment or departure of key personnel;
- actual and anticipated fluctuations in our quarterly operating results;
- the level of expenses related to any of our product candidates or clinical development programs;
- the results of our efforts to in-license or acquire additional products or product candidates;
- actual or anticipated changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- variations in our financial results or those of companies that are perceived to be similar to us;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- inconsistent trading volume levels of our shares;
- announcement or expectation 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;
- general economic, industry and market conditions; and
- the other factors described in this “Risk Factors” section.

In addition, in the past, stockholders have initiated class action lawsuits against companies following periods of volatility in the market prices of these companies’ stock. Such litigation, if instituted against us, could cause us to incur substantial costs and divert management’s attention and resources.

Concentration of ownership of our common stock among our existing executive officers, directors and principal stockholders may prevent new investors from influencing significant corporate decisions.

Our executive officers, directors and current beneficial owners of 5% or more of our common stock, in the aggregate, beneficially own a significant percentage of our outstanding common stock. These persons, acting together, will be able to significantly influence all matters requiring stockholder approval, including the election and removal of directors and any merger or other significant corporate transactions. The interests of this group of stockholders may not coincide with the interests of other stockholders.

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

The trading market for our common stock will depend in part on the research and reports that securities or industry analysts publish about us or our business, our market and our competitors. We do not have any control over these analysts. If one or more of the analysts who cover us downgrade our shares or change their opinion of our shares, our share price would likely decline. If one or more of these analysts cease coverage of our company or fail to regularly publish reports on us, we could lose visibility in the financial markets, which could cause our share price or trading volume to decline.

We will incur costs and demands upon management as a result of complying with the laws and regulations affecting public companies in the United States, which may harm our operating results.

As a public company listed in the United States, we have and will continue to incur significant additional legal, accounting and other expenses. In addition, changing laws, regulations and standards relating to corporate governance and public disclosure, including regulations implemented by the Securities and Exchange Commission, or SEC, and the Nasdaq Global Select Market, may increase legal and financial compliance costs and make some activities more time-consuming. These laws, regulations and standards are subject to varying interpretations, and as a result, their

application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. We intend to invest resources to comply with evolving laws, regulations and standards, and this investment may result in increased general and administrative expenses and a diversion of management's time and attention from

revenue-generating activities to compliance activities. If, notwithstanding our efforts to comply with new laws, regulations and standards, we fail to comply, regulatory authorities may initiate legal proceedings against us, and our business may be harmed.

Further, failure to comply with these laws, regulations and standards might also make it more difficult for us to obtain certain types of insurance, including director and officer liability insurance, and we might be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. The impact of these events could also make it more difficult for us to attract and retain qualified persons to serve on our Board of Directors, on committees of our Board of Directors or as members of senior management.

We do not anticipate paying any cash dividends on our common stock so any returns will be limited to changes in the value of our common stock.

We have never declared or paid cash dividends on our common stock. We currently intend to retain our future earnings, if any, to fund the development and growth of our business. In addition, the terms of any existing or future credit facility may restrict our ability to pay dividends. Any return to stockholders will therefore be limited to the increase, if any, of our stock price.

We are an “emerging growth company,” and we expect to comply with the reduced disclosure requirements applicable to emerging growth companies, which could make our common stock less attractive to investors.

We are an “emerging growth company,” as defined in the Jumpstart Our Business Startups Act, or JOBS Act, enacted in April 2012, and for as long as we continue to be an “emerging growth company,” we expect to take advantage of exemptions from various reporting requirements applicable to other public companies but not to “emerging growth companies,” including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and shareholder approval of any golden parachute payments not previously approved. We will continue to be an “emerging growth company” until the earlier of (1) the last day of the fiscal year (a) following the fifth anniversary of the closing of our initial public offering in October 2014, (b) in which we have total annual gross revenue of at least \$1.07 billion, or (c) in which we are deemed to be a large accelerated filer, which means the market value of our common stock that is held by non-affiliates exceeds \$700 million as of the prior June 30, and (2) the date on which we have issued more than \$1.0 billion in non-convertible debt during the prior three-year period. We cannot predict if investors will find our common stock less attractive by our reliance on these exemptions. If some investors find our common stock less attractive as a result of our choices to reduce disclosure, there may be a less active trading market for our common stock, and our stock price may be more volatile.

If we are unable to maintain proper and effective internal controls over financial reporting, the accuracy and timeliness of our financial reporting may be adversely affected.

Effective internal controls are necessary for us to provide reliable financial reports and to protect from fraudulent, illegal or unauthorized transactions. If we cannot provide effective controls and reliable financial reports, our business and operating results could be harmed. We have in the past discovered, and may in the future discover, areas of our internal controls that need improvement. We are required, pursuant to Section 404 of the Sarbanes-Oxley Act, to furnish a report by management on the effectiveness of our internal control over financial reporting. Our independent registered public accounting firm will not be required to attest to the effectiveness of our internal control over financial reporting until the earlier of the fifth anniversary of the closing of our initial public offering in October 2014 or until we are no longer an “emerging growth company.”

If material weaknesses or control deficiencies occur in the future, we may be unable to report our financial results accurately on a timely basis, which could cause our reported financial results to be materially misstated and result in the loss of investor confidence and cause the market price of our common stock to decline.

Provisions in our corporate charter documents and under Delaware law may prevent or frustrate attempts by our stockholders to change our management or hinder efforts to acquire a controlling interest in us, and the market price of our common stock may be lower as a result.

There are provisions in our certificate of incorporation and bylaws that may make it difficult for a third party to acquire, or attempt to acquire, control of our company, even if a change in control was considered favorable by our stockholders.

Our charter documents also contain other provisions that could have an anti-takeover effect, such as:

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- establishing a classified Board of Directors so that not all members of our Board of Directors are elected at one time;
- permitting the Board of Directors to establish the number of directors and fill any vacancies and newly created directorships;
- providing that directors may only be removed for cause;
- prohibits cumulative voting for directors;
- requiring super-majority voting to amend some provisions in our certificate of incorporation and bylaws;
- authorizing the issuance of “blank check” preferred stock that our Board of Directors could use to implement a stockholder rights plan;
- eliminating the ability of stockholders to call special meetings of stockholders; and
- prohibiting stockholder action by written consent, which requires all stockholder actions to be taken at a meeting of our stockholders.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which prohibit a person who owns 15% or more of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner. Any provision in our certificate of incorporation or our bylaws or Delaware law that has the effect of delaying or deterring a change in 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.

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

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware is the exclusive forum for any derivative action or proceeding brought on our behalf; any action asserting a breach of fiduciary duty; any action asserting a claim against us arising pursuant to the Delaware General Corporation Law, our amended and restated certificate of incorporation or our bylaws; or any action asserting a claim against us that is governed by the internal affairs doctrine. The choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and other employees. Some companies that adopted a similar federal district court forum selection provision are currently subject to a suit in the Chancery Court of Delaware by stockholders who assert that the provision is not enforceable. If a court were to find the choice of forum provision contained in our amended and restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could harm our business and financial condition.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Our headquarters are located at 343 Oyster Point Blvd., Suite 200, South San Francisco, California 94080 under a lease that expires in January 2024, with an option to extend another two years to January 2026. We have subleased a portion of this office and laboratory space to another biotechnology company under a three-year sublease agreement that expires in February 2020. We believe that our existing facilities are adequate for our current needs, as the facilities have sufficient laboratory space to house additional employees to be hired as we expand.

Item 3. Legal Proceedings.

From time to time, we may become involved in legal proceedings relating to claims arising from the ordinary course of business. Our management believes that there are currently no claims or actions pending against us, the ultimate disposition of which could have a material adverse effect on our results of operations, financial condition or cash flows.

Item 4. Mine Safety Disclosures.

Not applicable.

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PART II

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

Price Range of Common Stock

Our common stock commenced trading on the NASDAQ Global Select Market under the symbol "CALA" on October 2, 2014.

Holders

As of March 4, 2019, there were approximately 20 holders of record of our common stock.

Stock Price Performance Graph

The following stock performance graph compares our total stock return with the total return for (i) the NASDAQ Composite Index and the (ii) the NASDAQ Biotechnology Index for the period from October 2, 2014 (the date our common stock commenced trading on the NASDAQ Global Select Market) through December 31, 2018. The figures represented below assume an investment of \$100 in our common stock at the closing price of \$9.41 on October 2, 2014 and in the NASDAQ Composite Index and the NASDAQ Biotechnology Index on October 2, 2014 and the reinvestment of dividends into shares of common stock. The comparisons in the table are required by the SEC and are not intended to forecast or be indicative of possible future performance of our common stock.

		October	December	December	December	December
\$100 investment in stock or index	Ticker	2, 2014	31, 2015	31, 2016	31, 2017	31, 2018
Calithera Biosciences, Inc.	CALA	\$100.00	\$ 81.40	\$ 34.54	\$ 88.74	\$ 42.61
NASDAQ Composite Index	IXIC	\$100.00	\$ 113.03	\$ 121.51	\$ 155.83	\$ 149.77
NASDAQ Biotechnology Index	NBI	\$100.00	\$ 125.91	\$ 98.61	\$ 119.37	\$ 108.24

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.

Dividend Policy

We have never declared or paid cash dividends on our capital stock. We intend to retain all available funds and any future earnings, if any, to fund the development and expansion of our business and we do not anticipate paying any cash dividends in the foreseeable future. Any future determination related to dividend policy will be made at the discretion of our Board of Directors.

Issuer Purchases of Equity Securities

None.

Item 6. Selected Financial Data.

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, are derived from our audited consolidated financial statements included elsewhere in this Annual Report on Form 10-K. The selected balance sheet data as of December 31, 2016 is derived from our audited consolidated financial statements which are not included in this Annual Report on Form 10-K.

Our historical results are not necessarily indicative of the results to be expected in the future. You should read the selected financial data below in conjunction with the section of this report entitled “Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our consolidated financial statements and the related notes included in this Annual Report on Form 10-K.

	Year Ended December 31,		
	2018	2017	2016
	(in thousands, except per share data)		
Statements of Operation Data:			
Revenue:			
Collaboration revenue (1)	\$22,254	\$25,955	\$—
Total revenue (1)	22,254	25,955	—
Operating expenses:			
Research and development	66,195	43,111	27,748
General and administrative	13,340	12,530	10,586
Total operating expenses	79,535	55,641	38,334
Loss from operations	(57,281)	(29,686)	(38,334)
Interest income	2,652	1,860	330
Net loss	\$(54,629)	\$(27,826)	\$(38,004)
Net loss per share, basic and diluted	\$(1.49)	\$(0.84)	\$(1.95)
Shares used in computing net loss per share, basic and diluted	36,604	32,951	19,486
	Year Ended December 31,		
	2018	2017	2016
	(in thousands)		
Balance Sheet Data:			
Cash, cash equivalents, and investments	\$136,153	\$186,154	\$51,781
Working capital	125,371	128,640	49,108
Total assets	142,725	192,455	54,796
Deferred revenue	—	31,045	—
Accumulated deficit	(196,170)	(150,333)	(122,502)
Total stockholders' equity	126,714	150,307	49,906

- (1) In 2018, \$8.8 million of collaboration revenue was credited directly to accumulated deficit upon adoption of Accounting Standards Update No. 2014-09 (Topic 606) “Revenue from Contracts with Customers, or ASC 606. In 2018, we adopted ASC 606 using the modified retrospective method applied to our Incyte

Collaboration Agreement which was not completed as of January 1, 2018. As such, results for 2018 are presented under ASC 606, while the information for prior periods has not been adjusted and continues to be reported in accordance with our historical accounting under Topic 605 “Revenue Recognition”. Refer to Item 8, Notes to consolidated financial statements, Notes 2 and 10, for further information on the adoption of ASC 606 and the Incyte Collaboration Agreement.

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

You should read the following discussion and analysis of our financial condition and results of operations in conjunction with our consolidated financial statements and related notes included in Part II, Item 8 of this report.

This Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Exchange Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act. Forward-looking statements are identified by words such as "believe," "will," "may," "estimate," "continue," "anticipate," "intend," "should," "plan," "expect," "predict," "could," "potentially" or the negative terms or similar expressions. You should read these statements carefully because they discuss future expectations, contain projections of future results of operations or financial condition, or state other "forward-looking" information. These statements relate to our future plans, objectives, expectations, intentions and financial performance and the assumptions that underlie these statements. These forward-looking statements are subject to certain risks and uncertainties that could cause actual results to differ materially from those anticipated in the forward-looking statements. Factors that might cause such a difference include, but are not limited to, those discussed in this report in Part I, Item 1A — "Risk Factors," and elsewhere in this report. Forward-looking statements are based on our management's beliefs and assumptions and on information currently available to our management. These statements, like all statements in this report, speak only as of their date, and we undertake no obligation to update or revise these statements in light of future developments. We caution investors that our business and financial performance are subject to substantial risks and uncertainties.

Overview

We are a clinical-stage bio-pharmaceutical company focused on fighting cancer and other life threatening diseases by discovering and developing novel small molecule drugs that target cellular metabolism. Tumor metabolism and immuno-oncology have emerged as promising new fields for cancer drug discovery, and recent clinical successes with therapeutic agents in each field have created fundamentally new potential therapies for cancer patients. With our unique approach, we have established a broad pipeline of small molecule drug candidates that target enzymes controlling metabolically critical pathways in tumor cells and immune cells. We have four internally discovered clinical stage compounds that are all enzyme inhibitors. While we are primarily focused on oncology, we may opportunistically develop therapeutics outside of oncology where we can leverage our existing expertise in immune cell metabolism to treat life threatening diseases with unmet need.

Through genetic mutations that alter fundamental metabolic pathways, cancer cells can acquire the ability to grow in an uncontrolled manner, but they also acquire nutrient dependencies that can differentiate them from normal cells. Targeting these nutrient dependencies by inhibiting specific metabolic pathways in cancer cells is a novel therapeutic approach to blocking the uncontrolled growth of tumors. Our lead product candidate, telaglenastat (CB-839), takes advantage of the critical dependency many cancers including renal cell carcinoma, or RCC, have on the nutrient glutamine for growth and survival. We believe telaglenastat has the potential to be an important new therapeutic agent with a novel mechanism of action for the treatment of a broad range of cancers, and is the only selective allosteric glutaminase inhibitor currently in clinical trials. We retain all commercial rights to telaglenastat and have been granted a U.S. patent, which includes composition of matter coverage for telaglenastat through 2032.

We are currently developing telaglenastat in combination with standard therapies in a select set of solid tumors. Our lead development pathway is in RCC where we are evaluating telaglenastat in two randomized Phase 2 trials, including one with registrational intent. The ENTRATA trial (NCT03163667) is a Phase 2 randomized, double blind trial designed to evaluate the safety and efficacy of telaglenastat in combination with everolimus versus placebo with everolimus in patients with advanced clear cell RCC who have been treated with at least two prior lines of systemic therapy, including a VEGFR-targeted tyrosine kinase inhibitor. The primary endpoint of ENTRATA is progression-free survival (PFS). The trial enrolled 69 patients at multiple centers in the United States. Enrollment is

complete, and we plan to report efficacy and safety data from the trial in the second half of 2019.

Telaglenastat is also being investigated in the CANTATA trial (NCT03428217), which will enroll approximately 400 patients and is designed with registrational intent. It is a global, randomized, double-blind trial designed to evaluate the safety and efficacy of telaglenastat in combination with cabozantinib versus placebo with cabozantinib in patients with advanced clear cell RCC who have been treated with one or two prior lines of systemic therapy. The primary endpoint is PFS by blinded independent review, and a key secondary endpoint is overall survival. The trial is currently enrolling, and we plan to report topline efficacy and safety data in 2020.

Our product candidate, INCB001158 is an oral inhibitor of arginase, an enzyme that depletes the amino acid arginine, a key metabolic nutrient for T-cells. INCB001158 was discovered by Calithera and is being co-developed with Incyte Corporation, or Incyte, for oncology and hematology indications, and is currently being evaluated in Phase 1/2 trials as a monotherapy and in combination with other anti-cancer agents. Arginase depletes arginine, a nutrient that is critical for the activation and proliferation of the body's cancer-fighting immune cells, such as cytotoxic T-cells and natural killer (NK)-cells. In some physiological circumstances such as maternal-fetal immune tolerance, arginase-mediated depletion of arginine plays an important role in suppressing the immune system. But in many tumors, arginase-expressing myeloid cells accumulate and maintain an immunosuppressive environment, blocking the ability of T-cells and NK-cells to kill cancer cells. We have demonstrated that arginase-expressing myeloid cells can accumulate in a number of cancers, including lung, gastrointestinal, bladder, renal, squamous cell head and neck and acute myeloid leukemia. We believe that inhibitors of arginase can promote an anti-tumor immune response by restoring arginine levels, thereby allowing activation of the body's own immune cells, including cytotoxic T-cells and NK-cells. Data from the Phase 1/2 clinical trials of INCB001158 are expected to be presented at a medical meeting in the second half of 2019.

Our product candidate CB-280 is an oral arginase inhibitor for the treatment of cystic fibrosis. It is a novel oral arginase inhibitor which is solely owned by Calithera. In February, we initiated a Phase 1 trial designed to assess the safety, tolerability and pharmacokinetics of CB-280 in healthy volunteers. We anticipate completion of this study in 2019.

CB-708, our fourth compound planned to enter clinical trials, inhibits the oncometabolism target CD73. CD73 is an enzyme in the ATP adenosine metabolic pathway that plays a critical immunosuppressive role in tumors. Initiation of a Phase 1 study for CB-708, an orally administered small molecule inhibitor of CD73, is planned for 2019.

We are a fully integrated biopharmaceutical company with expertise in biology and chemistry, and our ongoing research efforts are focused on discovering additional product candidates for the treatment of cancer and other life threatening diseases. In addition to the products described above, we are also advancing additional preclinical stage programs with a focus on oncology.

Critical Accounting Policies and Estimates

Our management's discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with United States generally accepted accounting principles, or U.S. GAAP. The preparation of these consolidated financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the consolidated financial statements, as well as the reported expenses incurred during the reporting periods. Our estimates are based on our historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. We believe that the accounting policies discussed below are critical to understanding our historical and future performance, as these policies relate to the more significant areas involving management's judgments and estimates.

Revenue Recognition

Effective January 1, 2018, we adopted Accounting Standards Codification, or ASC, Revenue from Contracts with Customers (Topic 606), or ASC 606, using the modified retrospective approach. Under this approach, we recorded a cumulative adjustment to decrease accumulated deficit and deferred revenue by \$8.8 million. Under ASC 606, an entity recognizes revenue when its customer obtains control of promised goods or services, in an amount that reflects

the consideration that the entity expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements that an entity determines are within the scope of ASC 606, the entity performs the following five steps: (i) identify the contract(s) with a customer; (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 entity satisfies a performance obligation. We only apply the five-step model to contracts when it is probable that we will collect the consideration we are entitled to in exchange for the goods or services we transfer to the customer. At contract inception, once the contract is determined to be within the scope of ASC 606, we assess the goods or services promised within each contract and determine those that are performance obligations, and assess whether each promised good or service is distinct. We then recognize as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) the performance obligation is satisfied.

We have a collaboration and licensing agreement that is within the scope of ASC 606, under which we license certain rights to one of our product candidates to Incyte Corporation. The terms of this arrangement include payment to us of a non-refundable, upfront license fee, and potential development, regulatory and sales milestones, and sales royalties. Each of these payments results in collaboration revenues, except for revenues from royalties on net sales of licensed products, which would be classified as royalty revenues.

In determining the appropriate amount of revenue to be recognized as we fulfill our obligations under our agreement, we perform the following steps: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations; and (v) recognition of revenue when (or as) we satisfy each performance obligation. As part of the accounting for these arrangements, we must develop assumptions that require judgment to determine the stand-alone selling price for each performance obligation identified in the contract.

Licenses of Intellectual Property: If the license to our intellectual property is determined to be distinct from the other performance obligations identified in the arrangement, we recognize revenues from non-refundable, upfront fees allocated to the license when the license is transferred to the licensee and the licensee is able to use and benefit from the license. For licenses that are bundled with other promised goods or services, we utilize judgment to assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue from non-refundable, upfront fees. We evaluate the measure of progress each reporting period and, if necessary, adjust the measure of performance and related revenue recognition.

Milestone Payments: At the inception of each arrangement that includes development, regulatory or commercial milestone payments, we evaluate whether the milestones are considered probable of being reached and estimate the amount to be included in the transaction price. If it is probable that a significant reversal of cumulative revenue would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within our control or the licensees' control, such as regulatory approvals, are not considered probable of being achieved until those approvals are received or the underlying activity has been completed. The transaction price is then allocated to each performance obligation on a relative stand-alone selling price basis, for which we recognize revenue as or when the performance obligations under the contract are satisfied. At the end of each subsequent reporting period, we re-evaluate the probability of achievement of such development milestones and any related constraint, and if necessary, adjust our estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect collaboration revenue in the period of adjustment.

Royalties: For arrangements that include sales-based royalties, including milestone payments based on the level of sales, and the license is deemed to be the predominant item to which the royalties relate, we recognize revenue at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied (or partially satisfied). To date, we have not recognized any royalty revenue resulting from any of our licensing arrangements.

Contract Balances

Upfront payments and fees are recorded as deferred revenue upon receipt or when due, and may require deferral of revenue recognition to a future period until we perform our obligations under these arrangements. Amounts payable to us are recorded as accounts receivable when our right to consideration is unconditional.

We receive payments from Incyte based on billing schedules established in the contract. Upfront payments and fees are recorded as deferred revenue upon receipt or when due, and may require deferral of revenue recognition to a future period until we perform our obligations under these arrangements. Amounts are recorded as accounts receivable when our right to consideration is unconditional. We do not assess whether a contract has a significant financing component if the expectation at contract inception is such that the period between payment by the licensees and the transfer of the promised goods or services to the licensees will be one year or less.

Accrued Research and Development Costs

We record accrued liabilities for estimated costs of our research and development activities conducted by third-party service providers, which include the conduct of preclinical and clinical studies, and contract manufacturing activities. We record the estimated costs of research and development activities based upon the estimated amount of services provided but not yet invoiced, and include these costs in accrued liabilities in the balance sheets and within research and development expense in the statements of operations. These costs are a significant component of our research and development expenses. We accrue for these costs based on factors such as estimates of the work completed and in accordance with agreements established with our third-party service providers under the service agreements.

We have not experienced any material differences between accrued costs and actual costs incurred. However, the status and timing of actual services performed, number of patients enrolled, and the rate of patient enrollments may vary from our estimates, resulting in adjustments to expense in future periods. Changes in these estimates that result in material changes to our accruals could materially affect our results of operations.

Stock-Based Compensation

We recognize compensation costs related to stock options granted to employees and nonemployee directors based on the estimated fair value of the awards on the date of grant, net of forfeitures. Through December 31, 2016, we estimated forfeitures at the time of grant based on actual forfeiture experience, analysis of employee turnover behavior, and other factors and revised, if necessary, in subsequent periods if actual forfeitures differed from estimates. Upon the adoption of ASU No. 2016-09, Improvements to Employee Share-Based Payment Accounting, effective as of January 1, 2017, we elected to account for forfeitures as they occur. We estimate the grant date fair value for employee and nonemployee directors, and the resulting stock-based compensation expense, using the Black-Scholes option-pricing model. The grant date fair value of the stock-based awards is generally recognized on a straight-line basis over the requisite service period, which is generally the vesting period of the respective awards.

Stock-based option awards issued to non-employees are recorded at fair value as of the grant date using the Black-Scholes option-pricing model and recognized as expense on a straight-line basis over the vesting period. The fair value is re-measured each reporting period over the vesting term resulting in periodic adjustments to stock-based compensation expense.

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

Expected Term. Our expected term represents the period that our stock-based awards are expected to be outstanding and is determined using the simplified method (based on the mid-point between the vesting date and the end of the contractual term).

Expected Volatility. Since we have only been publicly traded for a short period and do not have adequate trading history for our common stock, the expected volatility was estimated based on a weighted volatility using both the trading history for our common stock and the average volatility for comparable publicly traded biopharmaceutical companies over a period equal to the expected term of the stock option grants. The comparable companies were chosen based on their similar size, stage in the life cycle, or area of specialty.

Risk-Free Interest Rate. The risk-free interest rate is based on the U.S. Treasury zero coupon issues in effect at the time of grant for periods corresponding with the expected term of option.

Expected Dividend. We have never paid dividends on our common stock and have no plans to pay dividends on our common stock. Therefore, we used an expected dividend yield of zero.

Income Taxes

As of December 31, 2018 and 2017, we had approximately \$167.3 million and \$129.3 million of federal operating loss carryforwards, respectively, and \$53.6 million and \$50.1 million of state operating loss carryforwards, respectively, available to reduce future taxable income that will begin to expire in 2030 for federal and state tax purposes.

As of December 31, 2018 and 2017, we also had research and development tax credit carryforwards of approximately \$8.1 million and \$5.5 million for federal purposes, respectively, and \$4.3 million and \$3.2 million for state purposes, respectively, available to offset future taxable income tax. If not utilized, the federal carryforwards will expire in various amounts beginning in 2030, and the state credits can be carried forward indefinitely.

Utilization of the net operating loss carryforwards may be subject to a substantial annual limitation due to the ownership change limitations provided by the Internal Revenue Code of 1986, as amended, and similar state provisions. We have performed an analysis to determine whether an "ownership change" has occurred from inception to December 31, 2014. Based on this analysis, management has determined that there was an ownership change. The annual limitation may result in the expiration of net operating losses and credits before utilization, however, we do not believe any of our net operating losses and research and development credits are limited by this potential ownership change. Subsequent ownership changes since 2014 may subject us to annual limitations of our net operating loss and credit carryforwards. Such annual limitation could result in the expiration of the net operating loss and credit carryforwards before utilization.

Financial Overview

Collaboration Revenue

Collaboration revenue represents the portion of deferred revenue recognized from a \$45.0 million upfront fee and \$12.0 million milestone achieved in the first quarter of 2017, from the Incyte Collaboration Agreement. The combined transaction price of \$57.0 million was recognized over the estimated period of performance under the Incyte Collaboration Agreement based on the measure of progress toward completion for the combined performance obligation, which was satisfied as of June 2018. Effective January 1, 2018, we adopted ASC 606 using the modified retrospective approach. Refer to Item 8, Notes to consolidated financial statements, Notes 2 and 10, for further information on the adoption of ASC 606 and the Incyte Collaboration Agreement.

Research and Development Expenses

Research and development expenses represent costs incurred to conduct research, such as the discovery and development of our product candidates. We recognize all research and development costs as they are incurred. Costs associated with co-development activities performed under our collaboration agreements with Incyte, Bristol-Myers Squibb, and Pfizer are included in research and development expenses, with any reimbursement of costs reflected as a reduction of such expenses.

Research and development expenses consist primarily of the following:

- employee-related expenses, which include salaries, benefits and stock-based compensation;
- expenses incurred under agreements with clinical trial sites that conduct research and development activities on our behalf;
- laboratory and vendor expenses related to the execution of preclinical studies and clinical trials;
- contract manufacturing expenses, primarily for the production of clinical supplies;
- facilities and other allocated expenses, which include direct and allocated expenses for rent and maintenance of facilities, depreciation expense and other supplies; and
- license fees and milestone payments related to our licensing agreements.

The largest component of our total operating expenses has historically been our investment in research and development activities including the clinical development of our product candidates. We allocate to research and development expenses the salaries, benefits, stock-based compensation expense, and indirect costs of our clinical and preclinical programs on a program-specific basis, and we include these costs in the program-specific expenses.

The following table shows our research and development expenses for 2018, 2017, and 2016:

	Year Ended December 31,		
	2018	2017	2016
	(in thousands)		
Development candidate:			
Telaglenastat (CB-839)	\$44,264	\$29,839	\$11,355
INCB001158	7,235	5,745	11,596
CB-280	3,830	—	—
Total development	55,329	35,584	22,951
Preclinical and research:			
Preclinical and research	10,866	7,527	4,797
Total	\$66,195	\$43,111	\$27,748

We expect our research and development expenses will increase during the next few years as we advance our product candidates into and through clinical trials, and pursue regulatory approval of our product candidates, which will require a significant investment in contract manufacturing and inventory build-up related costs.

The process of conducting clinical trials necessary to obtain regulatory approval is costly and time consuming. We may never succeed in achieving marketing approval for our product candidates. The probability of success of our product candidates may be affected by numerous factors, including clinical data, competition, manufacturing capability and commercial viability. As a result, we are unable to determine the duration and completion costs of our research and development projects or when and to what extent we will generate revenue from the commercialization and sale of any of our product candidates.

General and Administrative Expenses

General and administrative expenses consist of personnel costs, allocated expenses and other expenses for outside professional services, including legal, audit and accounting services. Personnel costs consist of salaries, benefits and stock-based compensation. Allocated expenses consist of facilities and other allocated expenses, which include direct and allocated expenses for rent and maintenance of facilities, depreciation expense and other supplies. We have incurred and expect to continue to incur additional expenses as a result of operating as a public company, including costs to comply with the rules and regulations applicable to companies listed on a national securities exchange and costs related to compliance and reporting obligations pursuant to the rules and regulations of the SEC, particularly after we cease to be an “emerging growth company.” In addition, we have incurred and expect to continue to incur increased expenses associated with being a public company, including additional legal, insurance, investor relations and other increases related to needs for additional human resources and professional services.

Results of Operations

Comparison of the Years Ended December 31, 2018 and 2017

Years Ended	Change
December 31,	

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	2018	2017	\$	%
	(in thousands, except percentages)			
Revenue:				
Collaboration revenue	\$22,254	\$25,955	\$(3,701)	-14%
Total revenue	22,254	25,955	(3,701)	-14%
Operating expenses:				
Research and development	66,195	43,111	23,084	54%
General and administrative	13,340	12,530	810	6%
Total operating expenses	79,535	55,641	23,894	43%
Loss from operations	(57,281)	(29,686)	(27,595)	93%
Interest income, net	2,652	1,860	792	43%
Net loss	\$(54,629)	\$(27,826)	\$(26,803)	96%

Collaboration Revenue

Collaboration revenue decreased from \$26.0 million for the year ended December 31, 2017 to \$22.2 million for the year ended December 31, 2018, or 14%. Collaboration revenue represents the portion of deferred revenue from the Incyte Collaboration Agreement recognized in the period. Effective January 1, 2018, we adopted ASC 606 using the modified retrospective approach. The decrease of \$3.7 million was primarily due the satisfaction of our and Incyte's combined performance obligation in June 2018 under the Incyte Collaboration Agreement, for which revenue recognized in each period was determined based on the measure of progress toward the completion of the manufacturing services and technology transfer to Incyte, partially offset by differences in accounting under the adoption of ASC 606. Refer to Item 8, Notes to consolidated financial statements, Notes 2 and 10, for further information on the adoption of ASC 606 and the Incyte Collaboration Agreement.

Research and Development

Research and development expenses increased \$23.1 million, or 54%, from \$43.1 million for 2017 to \$66.2 million for 2018. The increase of \$23.1 million was due to a \$14.4 million increase in the telaglenastat program to support our new and ongoing clinical trials, including for our Phase 2 CANTATA trial which opened in 2018, an increase of \$1.5 million in the INCB001158 program, an increase of \$3.8 million in the CB-280 program, and an increase of \$3.3 million for investment in our early stage research programs.

General and Administrative

General and administrative expenses increased \$0.8 million, or 6%, from \$12.5 million for 2017 to \$13.3 million for 2018. The increase was due to an increase of \$1.9 million in higher personnel-costs primarily as a result of higher headcount, salary increases and stock-based compensation expenses, partially offset by \$0.8 million of lower outside professional services, including legal expenses in connection with the Incyte Collaboration Agreement, and \$0.3 million lower expenses due to the execution of the sublease agreement for our office and laboratory space in the first quarter of 2017.

Interest Income

Interest income increased \$0.8 million, from \$1.9 million for the year ended December 31, 2017 to \$2.7 million for the year ended December 31, 2018. The increase of \$0.8 million was due to higher interest income generated from higher returns on our investments, partially offset by lower cash equivalents and investment balances compared to the prior year.

Comparison of the Years Ended December 31, 2017 and 2016

	Year Ended		Change	
	December 31, 2017	2016	\$	%
	(in thousands, except percentages)			
Revenue:				
Collaboration revenue	\$25,955	\$—	\$25,955	*
Total revenue	25,955	—	25,955	*

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Operating expenses:				
Research and development	43,111	27,748	15,363	55%
General and administrative	12,530	10,586	1,944	18%
Total operating expenses	55,641	38,334	17,307	45%
Loss from operations	(29,686)	(38,334)	8,648	-23%
Interest income, net	1,860	330	1,530	464%
Net loss		\$(27,826)	\$(38,004)	\$10,178 -27%

* Percentage not meaningful.

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Collaboration Revenue

Collaboration revenue increased \$26.0 million for the year ended December 31, 2017 and represented the portion of deferred revenue from the \$45.0 million upfront fee and \$12.0 million milestone achieved in the first quarter of 2017 from the Incyte Collaboration Agreement recognized ratably over the estimated performance period that was consistent with the term of our obligations under the agreement and prior to the adoption of ASC 606. Refer to Item 8, Notes to consolidated financial statements, Notes 2 and 10, for further information on the adoption of ASC 606 and the Incyte Collaboration Agreement.

Research and Development

Research and development expenses increased \$15.4 million, or 55%, from \$27.7 million for 2016 to \$43.1 million for 2017. The increase of \$15.4 million was due to an \$18.5 million increase in the telaglenastat program to support our new and ongoing clinical trials, including our two Phase 2 trials, as well as an increase of \$2.7 million from investment in our early stage research programs, offset by a decrease of \$5.8 million from the INCB001158 program, primarily due to Incyte's co-funding of development costs pursuant to the Incyte Collaboration Agreement.

General and Administrative

General and administrative expenses increased \$1.9 million, or 18%, from \$10.6 million for 2016 to \$12.5 million for 2017. The increase was due to an increase of \$1.0 million in professional services, including activities to support our collaboration and license agreements and our Phase 2 clinical trials, and an increase of \$0.9 million in higher personnel-related costs, primarily as a result of higher headcount, salary increases and stock-based compensation expenses.

Interest Income

Interest income increased \$1.5 million, from \$0.3 million for the year ended December 31, 2016 to \$1.8 million for the year ended December 31, 2017. The increase of \$1.5 million was due to higher interest income generated from higher returns on our investments and higher cash equivalents and investment balances compared to the prior year.

Liquidity and Capital Resources

As of December 31, 2018, we had cash, cash equivalents and investments totaling \$136.2 million. Our operations have been financed by net proceeds from the sale of shares of our capital stock and payments from the Incyte Collaboration Agreement.

In August 2017, we filed a shelf registration statement on Form S-3 with the Securities and Exchange Commission which permits the offering, issuance and sale by us of up to a maximum aggregate offering price of \$250.0 million of our common stock. As of December 31, 2018, \$234.2 million of our common stock remained available for sale, of which up to \$34.2 million may be issued and sold pursuant to an at-the-market offering program for sales of our common stock under a sales agreement with Cowen and Company, LLC, subject to certain conditions as specified in the sales agreement.

Our primary uses of cash are to fund operating expenses, primarily research and development expenditures. Cash used to fund operating expenses is impacted by the timing of when we pay these expenses, as reflected in the change in our outstanding accounts payable and accrued expenses.

We believe that our existing cash, cash equivalents and investments as of December 31, 2018 will be sufficient for us to meet our current operating plan for at least the twelve-month period following the filing of our December 31, 2018 Form 10-K. However, our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement that involves risks and uncertainties, and actual results could vary materially. In order to complete the process of obtaining regulatory approval for our product candidates and to build the sales, marketing and distribution infrastructure that we believe will be necessary to commercialize our product candidates, if approved, we will require substantial additional funding.

We have based our projections of operating capital requirements on assumptions that may prove to be incorrect and we may use all of our available capital resources sooner than we expect. Because of the numerous risks and uncertainties associated with research, development and commercialization of pharmaceutical products, we are unable to estimate the exact amount of our operating capital requirements. Our future funding requirements will depend on many factors, including, but not limited to:

- the timing and costs of our planned clinical trials for our product candidates;
- the timing and costs of our planned preclinical studies of our product candidates;

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- our success in establishing and scaling commercial manufacturing capabilities;
- the number and characteristics of product candidates that we pursue;
- the outcome, timing and costs of seeking regulatory approvals;
- subject to receipt of regulatory approval, revenue received from commercial sales of our product candidates;
- the terms and timing of any future collaborations, licensing, consulting or other arrangements that we may establish;
- the amount and timing of any payments we may be required to make in connection with the licensing, filing, prosecution, maintenance, defense and enforcement of any patents or patent applications or other intellectual property rights; and
- the extent to which we in-license or acquire other products and technologies.

We plan to continue to fund our operations and capital funding needs through reimbursement of expenses under our existing collaboration agreements and through equity and/or debt financing. We may also consider further collaborations or selectively partnering for clinical development and commercialization. The sale of additional equity would result in additional dilution to our stockholders. The incurrence of debt financing would result in debt service obligations and the instruments governing such debt could provide for operating and financing covenants that would restrict our operations. If we are not able to secure adequate additional funding we may be forced to make reductions in spending, extend payment terms with suppliers, liquidate assets where possible, and/or suspend or curtail planned programs. Any of these actions could harm our business, results of operations and future prospects.

The following table summarizes our cash flows for the periods indicated:

	Year Ended December 31,		
	2018	2017	2016
	(in thousands)		
Cash provided by (used in) operating activities	\$(64,842)	\$13,751	\$(31,025)
Cash provided by (used in) investing activities	\$52,799	\$(98,431)	\$23,705
Cash provided by financing activities	\$14,626	\$122,948	\$11,816

Cash Flows from Operating Activities

Cash used in operating activities for the year ended December 31, 2018 was \$64.8 million. Our net loss of \$54.6 million was offset in part by non-cash charges of \$7.4 million of stock-based compensation and \$0.2 million for depreciation and amortization. The change in operating assets and liabilities was primarily related to a \$22.2 million decrease in deferred revenue due to our Incyte Collaboration Agreement, and a \$5.2 million increase primarily due to the timing of payments for our clinical trial and manufacturing activities, partially offset by a \$0.9 million increase in the receivables, mainly related to our collaboration agreement with Incyte.

Cash provided by operating activities for the year ended December 31, 2017 was \$13.8 million. Our net loss of \$27.8 million was offset in part by non-cash charges of \$5.5 million of stock-based compensation and \$0.8 million for depreciation. The change in operating assets and liabilities was primarily related to a \$31.0 million increase in deferred revenue due to our Incyte Collaboration Agreement and a \$5.3 million increase primarily due to the timing of payments for our clinical trial and manufacturing activities, partially offset by a \$1.1 million increase in the receivables related to our collaboration agreements with Incyte and Bristol-Myers Squibb.

Cash used in operating activities for the year ended December 31, 2016 was \$31.0 million, consisting of a net loss of \$38.0 million, which was offset by non-cash charges \$0.9 million for depreciation expense and \$4.3 million for stock-based compensation. The change in our net operating assets and liabilities of \$1.8 million was primarily due to

the timing of payments for our clinical trial and manufacturing activities.

Cash Flows from Investing Activities

Cash provided by investing activities was \$52.8 million for the year ended December 31, 2018 and was related to the proceeds from the maturity of investments of \$129.1 million, partially offset by the purchase of investments of \$76.1 million and purchase of property and equipment of \$0.2 million.

Cash used in investing activities was \$98.4 million for the year ended December 31, 2017 and was related to the purchases of investments of \$194.7 million, partially offset by the maturity of investments of \$97.4 million, and purchase of property and equipment, primarily for leasehold improvements of our office and laboratory space, of \$1.2 million.

Cash provided by investing activities for the year ended December 31, 2016 was \$23.7 million and was related to the maturity of investments of \$68.7 million, offset by the purchase of investments of \$44.6 million, and purchase of property and equipment of \$0.4 million.

Cash Flows from Financing Activities

Cash provided by financing activities was \$14.6 million for the year ended December 31, 2018 and was related to \$13.7 million in net proceeds from the issuance of common stock through our at-the-market offering program, and issuance of common stock upon the exercise of stock options and employee stock plan purchases of \$0.9 million.

Cash provided by financing activities was \$122.9 million for the year ended December 31, 2017 and was related to \$75.4 million in net proceeds from the sale and issuance of common stock related to our public offering, \$7.9 million in net proceeds from the issuance of common stock under our stock purchase agreement with Incyte, \$38.3 million in net proceeds from the issuance of common stock through our at-the-market offering programs, and issuance of common stock upon the exercise of stock options and employee stock plan purchases of \$1.3 million.

Cash provided by financing activities for the year ended December 31, 2016 was \$11.8 million and was from the issuance of common stock through an at-the-market offering program of \$11.3 million and from the issuance of common stock upon the exercise of stock options and employee stock plan purchases of \$0.5 million.

Contractual Obligations and Other Commitments

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

Contractual Obligations:	Payments Due By Period					Total
	Less Than 1 Year	1 to 3 Years	3 to 5 Years	More Than 5 Years		
	(In thousands)					
Operating lease obligations ⁽¹⁾	\$2,260	\$4,755	\$5,045	\$219		\$12,279
Less: sublease income ⁽²⁾	(1,115)	(187)	—	—		(1,302)
Total contractual obligations ⁽³⁾	\$1,145	\$4,568	\$5,045	\$219		\$10,977

1. Represents future minimum lease payments under the non-cancelable lease for our headquarters in South San Francisco, California. The minimum lease payments above do not include any related common area maintenance charges or real estate taxes.
2. In February 2017, we entered into a non-cancelable sublease agreement for a portion of our facilities, from March 2017 through February 2020.
3. We enter into agreements in the normal course of business with organizations for collaborations or in-licensing arrangements, contract research organizations for clinical trials and vendors for preclinical studies and other services and products for operating purposes which are cancelable at any time by us, generally upon 30 to 60 days prior written notice. These payments are not included in this table of contractual obligations.

Off-Balance Sheet Arrangements

During 2018, 2017, and 2016 we did not have any off-balance sheet arrangements.

JOBS Act Accounting Election

We are an “emerging growth company,” as defined in the JOBS Act. Under the JOBS Act, emerging growth companies can delay adopting new or revised accounting standards issued subsequent to the enactment of the JOBS Act until such time as those standards apply to private companies. We have irrevocably elected not to avail ourselves of this exemption from new or revised accounting standards, and, therefore, are subject to the same new or revised accounting standards as other public companies that are not emerging growth companies.

Recent Accounting Pronouncements

Please refer to Note 2 to our audited consolidated financial statements appearing under Part II, Item 8 for a discussion of new accounting standards updates that may impact us.

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

We are exposed to market risks in the ordinary course of our business. These risks primarily include interest rate sensitivities. Our investment policy allows us to maintain a portfolio of cash equivalents and investments in a variety of high credit quality securities issued by the U.S. government, U.S. government-sponsored agencies and highly rated banks and corporations, subject to certain concentration limits. Our investment policy prohibits us from holding auction rate securities or derivative financial instruments. As of December 31, 2018, we had cash, cash equivalents and investments of \$136.2 million. A portion of our investments may be subject to interest rate risk and could fall in value if market interest rates increase. However, we believe that our exposure to interest rate risk is not significant as the majority of our investments are short-term in duration and due to the low risk profile of our investments, a 1% change in interest rates would not have a material impact on the total market value of our portfolio. We have the ability to hold our short-term investments until maturity, and therefore we do not expect that our results of operations or cash flows would be adversely affected by any change in market interest rates on our investments. We actively monitor changes in interest rates. We had no outstanding debt as of December 31, 2018.

Item 8. Consolidated Financial Statements and Supplementary Data.
CALITHERA BIOSCIENCES, INC.

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Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Calithera Biosciences, Inc.

Opinion on the Financial Statements

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

Adoption of ASU No. 2019-14

As discussed in Note 2 to the consolidated financial statements, the Company changed its method of accounting for revenue recognition due to the adoption of ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606), using the modified retrospective method 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 Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

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

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

/s/ Ernst & Young LLP

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

Redwood City, California

March 7, 2019

Calithera Biosciences, Inc.

Consolidated Balance Sheets

(in thousands, except per share amounts)

	December 31,	
	2018	2017
Assets		
Current assets:		
Cash and cash equivalents	\$51,058	\$48,475
Short-term investments	85,095	115,318
Receivables from collaborations	1,997	1,142
Prepaid expenses and other current assets	2,102	2,732
Total current assets	140,252	167,667
Long-term investments	—	22,361
Other assets	569	228
Restricted cash	440	440
Property and equipment, net	1,464	1,759
Total assets	\$142,725	\$192,455
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	\$1,247	\$1,072
Accrued liabilities	13,634	8,938
Current portion of deferred revenue	—	29,017
Total current liabilities	14,881	39,027
Deferred revenue, less current portion	—	2,028
Deferred rent	1,130	1,093
Total liabilities	16,011	42,148
Commitments and contingencies (Note 5)		
Stockholders' equity:		
Preferred stock, \$0.0001 par value, 10,000 shares authorized as of		
December 31, 2018 and 2017; no shares issued and outstanding as of	—	—
December 31, 2018 and 2017		
Common stock, \$0.0001 par value, 200,000 shares authorized as of		
December 31, 2018 and 2017; 38,834 and 35,759 shares		
issued and outstanding as of December 31, 2018 and 2017, respectively	4	4
Additional paid-in capital	322,993	300,906
Accumulated deficit	(196,170)	(150,333)
Accumulated other comprehensive loss	(113)	(270)
Total stockholders' equity	126,714	150,307
Total liabilities and stock and stockholders' equity	\$142,725	\$192,455

See accompanying notes.

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Calithera Biosciences, Inc.

Consolidated Statements of Operations

(in thousands, except per share amounts)

	Year Ended December 31,		
	2018	2017	2016
Revenue:			
Collaboration revenue	\$22,254	\$25,955	\$—
Total revenue	22,254	25,955	—
Operating expenses:			
Research and development	66,195	43,111	27,748
General and administrative	13,340	12,530	10,586
Total operating expenses	79,535	55,641	38,334
Loss from operations	(57,281)	(29,686)	(38,334)
Interest income, net	2,652	1,860	330
Net loss	\$(54,629)	\$(27,826)	\$(38,004)
Net loss per share, basic and diluted	\$(1.49)	\$(0.84)	\$(1.95)
Weighted average common shares used to compute			
net loss per share, basic and diluted	36,604	32,951	19,486

See accompanying notes.

Calithera Biosciences, Inc.

Consolidated Statements of Comprehensive Loss

(in thousands)

	Year Ended December 31,		
	2018	2017	2016
Net loss	\$(54,629)	\$(27,826)	\$(38,004)
Other comprehensive gain (loss):			
Net unrealized gain (loss) on available-for-sale securities	157	(257)	56
Total comprehensive loss	\$(54,472)	\$(28,083)	\$(37,948)

See accompanying notes.

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Calithera Biosciences, Inc.

Consolidated Statements of Stockholders' Equity

(in thousands, except per share amounts)

	Common Stock			Accumulated Deficit	Accumulated Other Comprehensive Income	Total Stockholders' Equity
	Shares	Amount	Additional Paid-In Capital			
Balance at December 31, 2015	18,232	\$ 2	\$ 156,353	\$ (84,498)	\$ (69)	\$ 71,788
Issuance of common stock in connection with						
at-the-market offering, net of underwriting	3,059	—	11,281	—	—	11,281
commissions and issuance costs						
Exercise of stock options	99	—	177	—	—	177
Issuance of common stock per ESPP purchase	112	—	358	—	—	358
Stock-based compensation expense	—	—	4,250	—	—	4,250
Net loss	—	—	—	(38,004)	—	(38,004)
Unrealized gain on available-for-sale securities	—	—	—	—	56	56
Balance at December 31, 2016	21,502	2	172,419	(122,502)	(13)	49,906
Issuance of common stock in connection with						
at-the-market offering, net of underwriting	4,351	1	38,314	—	—	38,315
commissions and issuance costs						
Issuance of common stock in connection with						
public offering, net of underwriting	7,855	1	75,385	—	—	75,386
commissions and issuance costs						
Issuance of common stock in connection with						
Incyte Stock Purchase Agreement, net of	1,720	—	7,914	—	—	7,914
issuance costs						

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Exercise of stock options	153	—	787	—	—	787
Issuance of common stock per ESPP purchase	178	—	546	—	—	546
Stock-based compensation expense	—	—	5,541	—	—	5,541
Cumulative-effect adjustment from adoption						
of accounting standard on stock-based compensation	—	—	—	(5)	(5
Net loss	—	—	—	(27,826)	(27,826
Unrealized loss on available-for-sale securities	—	—	—	—	(257) (257
Balance at December 31, 2017	35,759	4	300,906	(150,333)	(270
Issuance of common stock in connection with						
at-the-market offering, net of underwriting commissions and issuance costs	2,731	—	13,729	—	—	13,729
Exercise of stock options	125	—	247	—	—	247
Issuance of common stock per ESPP purchase	219	—	674	—	—	674
Stock-based compensation expense	—	—	7,437	—	—	7,437
Cumulative-effect adjustment from adoption						
of ASC 606 accounting standard on revenue recognition	—	—	—	8,792	—	8,792
Net loss	—	—	—	(54,629)	(54,629
Unrealized gain on available-for-sale securities	—	—	—	—	157	157
Balance at December 31, 2018	38,834	\$ 4	\$ 322,993	\$ (196,170)	\$ (113
) \$ 126,714

See accompanying notes.

Calithera Biosciences, Inc.

Consolidated Statements of Cash Flows

(in thousands)

	Year Ended December 31,		
	2018	2017	2016
Cash Flows Provided By (Used In) Operating Activities			
Net loss	\$(54,629)	\$(27,826)	\$(38,004)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation	505	365	297
Amortization of premiums (discounts) on investments	(272)	446	590
Stock-based compensation	7,437	5,536	4,250
Loss on disposal of property and equipment	—	9	—
Changes in operating assets and liabilities:			
Receivables from collaborations	(855)	(1,142)	—
Prepaid expenses and other current assets	630	(952)	787
Other assets	(341)	62	(9)
Accounts payable	175	674	(28)
Accrued liabilities	4,725	4,878	925
Deferred revenue	(22,254)	31,045	—
Deferred rent	37	656	167
Net cash provided by (used in) operating activities	(64,842)	13,751	(31,025)
Cash Flows Provided By (Used In) Investing Activities			
Purchases of investments	(76,107)	(194,650)	(44,618)
Proceeds from the maturity of investments	129,120	97,448	68,724
Purchase of property and equipment	(214)	(1,229)	(401)
Net cash provided by (used in) investing activities	52,799	(98,431)	23,705
Cash Flows Provided By Financing Activities			
Proceeds from issuance of common stock upon public offering, net	—	75,386	—
Proceeds from issuance of common stock under stock purchase agreement, net	—	7,914	—
Proceeds from issuance of common stock through at-the-market offerings, net	13,705	38,315	11,281
Proceeds from stock option exercises and employee stock plan purchases	921	1,333	535
Net cash provided by financing activities	14,626	122,948	11,816
Net increase in cash, cash equivalents, and restricted cash	2,583	38,268	4,496
Cash, cash equivalents, and restricted cash at beginning of period	48,915	10,647	6,151
Cash, cash equivalents, and restricted cash at end of period	\$51,498	\$48,915	\$10,647
Supplemental Disclosure of Non-Cash Investing and Financing Information:			
Change in unpaid amounts related to property and equipment purchases	\$(5)	\$5	\$—
Change in unpaid amounts related to deferred financing costs	\$24	\$—	\$—

See accompanying notes.

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Calithera Biosciences, Inc.

Notes to Consolidated Financial Statements

1. Organization and Basis of Presentation

Organization

Calithera Biosciences, Inc., or the Company, was incorporated in the State of Delaware on March 9, 2010. The Company is a clinical-stage biopharmaceutical company focused on discovering and developing small molecule drugs that target novel and critical metabolic pathways in tumor and cancer-fighting immune cells. The Company's principal operations are based in South San Francisco, California, and it operates in one segment.

Presentation

The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiary, Calithera Biosciences UK Limited, incorporated on April 20, 2017. All significant intercompany accounts and transactions have been eliminated from the consolidated financial statements.

Liquidity

In the course of its development activities, the Company has sustained operating losses and expects such losses to continue over the next several years. The Company's ultimate success depends on the outcome of its research and development activities. The Company has incurred net losses from operations since inception and has an accumulated deficit of \$196.2 million as of December 31, 2018. The Company intends to raise additional capital through the issuance of additional equity, and potentially through strategic alliances with partner companies. However, if such financing is not available at adequate levels, the Company will need to reevaluate its operating plans. Management believes that the currently available resources will provide sufficient funds to enable the Company to meet its operating plan for at least the twelve-month period following the filing of the Company's 2018 consolidated financial statements on Form 10-K. However, if the Company's anticipated operating results are not achieved in future periods, management believes that planned expenditures may need to be reduced in order to extend the time period over which the then-available resources would be able to fund the Company's operations.

2. Summary of Significant Accounting Policies

Use of Estimates

The accompanying consolidated financial statements have been prepared in accordance with U.S. generally accepted accounting principles, or GAAP. The preparation of consolidated financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities as of the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. On an ongoing basis, management evaluates its estimates, including those related to clinical trial accrued liabilities, revenue recognition, fair value of marketable securities, income taxes, and stock-based compensation. Management bases its estimates on historical experience and on various other market specific and relevant assumptions that management believes to be reasonable under the

circumstances. Actual results could differ from those estimates.

Cash and Cash Equivalents

The Company considers all highly liquid investments with original maturities of three months or less at the date of purchase to be cash equivalents. Cash equivalents, which consist primarily of amounts invested in money market accounts, are stated at fair value.

Investments

All investments have been classified as “available-for-sale” and are carried at estimated fair value as determined based upon quoted market prices or pricing models for similar securities. Management determines the appropriate classification of its investments at the time of purchase and reevaluates such designation as of each balance sheet date. Unrealized gains and losses are excluded from earnings and are reported as a component of comprehensive loss. Realized gains and losses and declines in fair value judged to be other than temporary, if any, on available-for-sale securities are included in interest income, net. The cost of securities sold is based on the specific-identification method. Interest on marketable securities is included in interest income, net.

Receivables from Collaborations

Receivables from collaborations represent amounts due under the terms of the Company's collaboration agreements, primarily its collaboration agreement with Incyte Corporation, or Incyte, as described in Note 10, Collaboration and Licensing Agreements - Incyte Collaboration and License Agreement, for reimbursements of certain costs. Based on its evaluation of credit worthiness and historical payment patterns, the Company did not record any allowance for doubtful accounts as of December 31, 2018 and 2017.

Restricted Cash

Restricted cash consists of money market funds held by the Company's financial institution as collateral for the Company's obligations under its facility lease for the Company's corporate headquarters in South San Francisco, California.

Concentration of Credit Risk

Financial instruments that potentially subject the Company to a concentration of credit risk consist of cash, cash equivalents, investments and restricted cash. The Company invests in a variety of financial instruments and, by its policy, limits these financial instruments to high credit quality securities issued by the U.S. government, U.S. government-sponsored agencies and highly rated banks and corporations, subject to certain concentration limits. The Company's cash, cash equivalents, investments and restricted cash are held by financial institutions in the United States that management believes are of high credit quality. Amounts on deposit may at times exceed federally insured limits.

All of the Company's collaboration revenue and the majority of the Company's receivables from collaborations are derived from its collaboration and license agreement with Incyte as described in Note 10, Collaboration and Licensing Agreements - Incyte Collaboration and License Agreement.

Property and Equipment

Property and equipment are stated at cost, less accumulated depreciation. Depreciation is computed using the straight-line method over the estimated useful lives of the respective assets. Depreciation begins at the time the asset is placed in service. Maintenance and repairs are charged to operations as incurred. Upon sale or retirement of assets, the cost and related accumulated depreciation is removed from the balance sheet and the resulting gain or loss is reflected in operations.

The useful lives of property and equipment are as follows:

Research and development equipment	5 years
Furniture and office equipment	5 years
Computer equipment	3 years
Software	3 years
Leasehold improvements	Shorter of remaining lease term or estimated useful life

Impairment of Long-Lived Assets

The Company evaluates its long-lived assets, including property and equipment, for impairment whenever events or changes in circumstances indicate that the carrying value of these assets may not be recoverable. Recoverability of these assets is measured by comparison of the carrying amount of each asset to the future undiscounted cash flows the asset is expected to generate over its remaining life. If the asset is considered to be impaired, the amount of any impairment is measured as the difference between the carrying value and the fair value of the impaired asset. The Company has not recorded impairment of any long-lived assets during any of the periods presented.

Revenue Recognition

Effective January 1, 2018, the Company adopted Accounting Standards Codification, or ASC No. 2014-09, Revenue from Contracts with Customers (Topic 606), or ASC 606, using the modified retrospective approach. Under this approach, the Company recorded a cumulative adjustment to decrease accumulated deficit and deferred revenue by \$8.8 million. Under ASC 606, an entity recognizes revenue when its customer obtains control of promised goods or services, in an amount that reflects the consideration that the entity expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements that an entity determines are within the scope of ASC 606, the entity performs the following five steps: (i) identify the contract(s) with a customer;

(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 entity satisfies a performance obligation. The Company only applies the five-step model to contracts when it is probable that the entity will collect the consideration it is entitled to in exchange for the goods or services it transfers to the customer. At contract inception, once the contract is determined to be within the scope of ASC 606, the Company assesses the goods or services promised within each contract and determines those that are performance obligations, and assesses whether each promised good or service is distinct. The Company then recognizes as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) the performance obligation is satisfied.

The Company has a collaboration and license agreement with Incyte, or the Incyte Collaboration Agreement, that is within the scope of ASC 606, under which it licenses certain rights to one of its product candidates to Incyte Corporation. The terms of this arrangement include payment to the Company of a non-refundable, upfront license fee, and potential development, regulatory and sales milestones, and sales royalties. Each of these payments results in collaboration revenues, except for revenues from royalties on net sales of licensed products, which would be classified as royalty revenues.

In determining the appropriate amount of revenue to be recognized as it fulfills its obligations under its agreement, the Company performs the following steps: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations; and (v) recognition of revenue when (or as) the Company satisfies each performance obligation. As part of the accounting for these arrangements, the Company must develop assumptions that require judgment to determine the stand-alone selling price for each performance obligation identified in the contract.

Licenses of Intellectual Property: If the license to the Company's intellectual property is determined to be distinct from the other performance obligations identified in the arrangement, the Company recognizes revenues from non-refundable, upfront fees allocated to the license when the license is transferred to the licensee and the licensee is able to use and benefit from the license. For licenses that are bundled with other promised goods or services, the Company utilizes judgment to assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue from non-refundable, upfront fees. The Company evaluates the measure of progress each reporting period and, if necessary, adjusts the measure of performance and related revenue recognition.

Milestone Payments: At the inception of each arrangement that includes development, regulatory or commercial milestone payments, the Company evaluates whether the milestones are considered probable of being reached and estimates the amount to be included in the transaction price. If it is probable that a significant reversal of cumulative revenue would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within the control of the Company or the licensee, such as regulatory approvals, are not considered probable of being achieved until those approvals are received or the underlying activity has been completed. The transaction price is then allocated to each performance obligation on a relative stand-alone selling price basis, for which the Company recognizes revenue as or when the performance obligations under the contract are satisfied. At the end of each subsequent reporting period, the Company re-evaluates the probability of achievement of such development milestones and any related constraint, and if necessary, adjusts its estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect collaboration revenue in the period of adjustment.

Royalties: For arrangements that include sales-based royalties, including milestone payments based on the level of sales, and the license is deemed to be the predominant item to which the royalties relate, the Company recognizes revenue at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty that has been allocated has been satisfied (or partially satisfied). To date, the Company has not recognized any royalty revenue resulting from any of its licensing arrangements.

The following table summarizes the impact of adopting ASC 606 on select consolidated statement of operations line items for the year ended December 31, 2018 (in thousands, except per share data):

Balances
Without
the