UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 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, 2020
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: 001-35867

Chimerix, Inc.

(Exact Name of Registrant as Specified in its Charter)

Delaware	**33-0903395**
(State or Other Jurisdiction of Incorporation or Organization)	**(I.R.S. Employer Identification No.)**
2505 Meridian Parkway, Suite 100 Durham, North Carolina	**27713**
(Address of Principal Executive Offices)	**(Zip Code)**

(919) 806-1074
(Registrant's Telephone Number, Including Area Code)

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, par value $0.001 per share	CMRX	The Nasdaq Global Market

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

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes x No o

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

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes x No o

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 x No o

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See 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 o	Accelerated filer o
	Smaller reporting company ☒
Non-accelerated filer x	
	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. o

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Securities Exchange Act of 1934). Yes ☐ No x

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant based upon the closing price of its Common Stock on The Nasdaq Global Market on June 30, 2020 was $135,565,762.

The number of outstanding shares of the registrant’s common stock, par value $0.001 per share, as of February 19, 2021 was 85,679,225.

DOCUMENTS INCORPORATED BY REFERENCE

Document Description	**10-K Part**
Portions of the registrant’s notice of annual meeting of stockholders and proxy statement to be filed pursuant to Regulation 14A within 120 days after registrant’s fiscal year end of December 31, 2020 are incorporated by reference into Part III of this report……	III

CHIMERIX, INC.
FORM 10-K
For the Fiscal Year Ended December 31, 2020
Table of Contents

PART I

Forward-Looking Statements

This Annual Report on Form 10-K (Annual Report) may contain "forward-looking statements" within the meaning of the federal securities laws made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth below under Part I, Item 1A, "Risk Factors" in this Annual Report. Except as required by law, we assume no obligation to update these forward-looking statements, whether as a result of new information, future events or otherwise. These statements, which represent our current expectations or beliefs concerning various future events that are subject to risks and uncertainties, may contain words such as "may," "will," "expect," "anticipate," "intend," "plan," "believe," "estimate" or other words indicating future results. Such statements may include, but are not limited to, statements concerning the following:

- the initiation, cost, enrollment, timing, progress and results of our research and development activities, preclinical studies and future clinical trials;
- our ability to obtain and maintain regulatory approval of our current and future product candidates, and any related restrictions, limitations, and/or warnings in the label of an approved product candidate;
- our ability to obtain funding for our operations;
- our plans to research, develop and commercialize our future product candidates;
- our strategic alliance partners' election to pursue development and commercialization;
- our ability to attract collaborators with development, regulatory and commercialization expertise;
- our ability to obtain and maintain intellectual property protection for our future product candidates;
- the size and growth potential of the markets for our current and future product candidates, and our ability to serve those markets;
- our ability to successfully commercialize our current and future product candidates;
- the rate and degree of market acceptance of our current and future product candidates;
- our ability to develop sales and marketing capabilities, whether alone or with potential future collaborators;
- regulatory developments in the United States and foreign countries;
- the performance of our third-party suppliers and manufacturers;
- the success of competing therapies that are or become available;
- the loss of key scientific or management personnel;
- our use of the proceeds from our public offerings; and
- the accuracy of our estimates regarding expenses, future revenues, capital requirements and need for additional financing.

Summary of Risk Factors

Below is a summary of material factors that make an investment in our common stock speculative or risky. Importantly, this summary does not address all of the risks and uncertainties that we face. Additional discussion of the risks and uncertainties summarized in this risk factor summary, as well as other risks and uncertainties that we face, can be found under "Risk Factors" in Part I, Item 1A of this Annual Report. The below summary is qualified in its entirety by that more complete discussion of such risks and uncertainties. You should consider carefully the risks and uncertainties described under "Risk Factors" in Part I, Item 1A of this Annual Report as part of your evaluation of an investment in our common stock.

- We have incurred significant losses since our inception. We anticipate that we will continue to incur significant losses for the foreseeable future, and we may never achieve or maintain profitability.
- Our product candidates are still under clinical development and may not obtain regulatory approval or be successfully commercialized. We have never obtained regulatory approval for a drug and we may be unable to obtain, or may be delayed in obtaining, regulatory approval for most advanced clinical candidates: BCV, ONC201 and DSTAT.
- Our ability to generate future revenues from product sales is uncertain and depends upon our ability to successfully develop, obtain regulatory approval for, and commercialize product candidates.
- Even if we obtain regulatory approval for any of our product candidates, including BCV, ONC201 and DSTAT, we will still face extensive regulatory requirements and our products may face future development and regulatory difficulties.
- We rely on third-party manufacturers to produce our preclinical and clinical drug supplies, and we intend to rely on third parties to produce commercial supplies of any approved product candidates. We rely on limited sources of supply for the drug components for each of our product candidates including, BCV, ONC201 and DSTAT, and

any disruption in the chain of supply for either of these product candidates may cause delays in their development and commercialization.

- We are evaluating external assets to build our pipeline of product candidates and there can be no assurance that we will be successful in identifying or completing a transaction for a candidate, that any such transaction will result in additional value for our stockholders or that the process will not have an adverse impact on our business. For example, we may experience difficulties in integrating the operations of Oncoceutics into our business and in realizing the expected benefits of the merger with Oncoceutics.
- If we are unable to obtain or protect intellectual property rights related to our products and product candidates, we may not be able to compete effectively in our market .
- If we fail to comply with the extensive legal and regulatory requirements affecting the health care industry, we could face increased costs, delays in the development of our product candidates, penalties and a loss of business.
- We face risks related to the coronavirus (COVID-19) outbreak, which could significantly disrupt our preclinical studies and clinical trials.

Market, Industry and Other Data

This Annual Report contains estimates, projections and other information concerning our industry, our business and relevant markets, including data regarding the estimated size of relevant antiviral markets, patient populations, projected diagnosis rates and the perceptions and preferences of patients and physicians regarding certain therapies, as well as data regarding market research and estimates. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances that are assumed in this information. Unless otherwise expressly stated, we obtained this industry, business, market and other data from reports, research surveys, studies and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data and similar sources that we believe to be reliable. In some cases, we do not expressly refer to the sources from which this data is derived. In that regard, when we refer to one or more sources of this type of data in any paragraph, you should assume that other data of this type appearing in the same paragraph are derived from the same sources, unless otherwise expressly stated or the context otherwise requires.

ITEM 1. BUSINESS

Chimerix Overview

Chimerix is a development-stage biopharmaceutical company dedicated to accelerating the advancement of innovative medicines that make a meaningful impact in the lives of patients living with cancer and other serious diseases. Our three most advanced clinical-stage development programs are brincidofovir (BCV), ONC201 and dociparstat sodium (DSTAT). BCV is an antiviral drug candidate developed as a potential medical countermeasure for smallpox and is currently under review for regulatory approval in the United States. ONC201 is currently being investigated in a number of efficacy studies for recurrent H3 K27M-mutant glioma and a confirmatory response rate assessment, potentially sufficient for accelerated approval, is expected later this year. DSTAT is in Phase 3 development as a potential first-line therapy in acute myeloid leukemia (AML) and as a potential treatment for acute lung injury (ALI) in COVID-19 patients.

Brincidofovir (BCV)

BCV is an investigational lipid conjugate which acts via inhibition of viral DNA synthesis that is in development as a medical countermeasure for smallpox. It is being developed under the FDA Animal Efficacy Rule, which allows for testing of investigational drugs in animal models to support the effectiveness of treatments against diseases that are not ethical or feasible to study in humans.

We completed the rolling NDA submission for BCV tablets and for BCV suspension for the approval of BCV as a medical countermeasure for smallpox. In December 2020 we announced that the FDA had accepted the filing of the NDA. The FDA granted priority review and set a Prescription Drug User Fee Act (PDUFA) date of April 7, 2021. In January 2021, we received notification from the FDA that the PDUFA date for review of BCV as a medical countermeasure for smallpox has been moved to July 7, 2021. Specifically, FDA requested we provide a dose recommendation for infants up to three months of age. In response, we submitted to the FDA the requested modelled analyses, which resulted in the same weight-based dosing recommendation previously proposed for older pediatric patients. The ability to dose across all pediatric age groups with a convenient oral suspension formulation is a unique aspect of the BCV smallpox treatment. The FDA required an additional three months to review this information. We do not expect a delayed FDA action date to impact the timing of the BARDA request for proposal, which is expected this quarter, nor the potential timing of first shipments of BCV to the strategic national stockpile, expected in the second half of this year.

BCV has received Fast Track designation and Orphan Drug Designation from the FDA for the treatment of smallpox.

We are collaborating with the Biomedical Advanced Research and Development Authority (BARDA) for the development of BCV as a potential medical countermeasure for smallpox. Efficacy is to be demonstrated via two animal models under the FDA's Animal Efficacy Rule.

Prior to May 2019, we had been developing oral and intravenous BCV for the treatment and prevention of multiple DNA viruses. In May 2019, we decided to discontinue both the oral and IV development programs of BCV in adenovirus (AdV) and the associated clinical trials.

In September 2019, we entered into a license agreement for certain rights to BCV with SymBio Pharmaceuticals. Under the terms of the agreement SymBio received exclusive worldwide rights to develop, manufacture and commercialize BCV in all human indications, excluding the prevention and treatment of orthopox viruses, which includes smallpox. Also, per the agreement, we received an upfront payment of $5 million plus potential clinical, regulatory and commercial milestones of up to $180 million. In addition, we are eligible to receive double-digit royalties on net sales of BCV worldwide.

Oncoceutics Acquisition

On January 7, 2021, we acquired Oncoceutics, Inc. (Oncoceutics), a privately-held, clinical-stage biotechnology company developing imipridones, a novel potential class of small molecule compounds. Oncoceutics' lead product candidate, ONC201, selectively induced cell death in multiple cancer types in clinical trials. ONC201 is currently being evaluated in a registrational program for recurrent H3 K27M-mutant glioma and a response rate assessment of the registrational cohort is expected in 2021.

Imipridones and ONC201

Imipridones are a potential new class of selective cancer therapies. These drug candidates target specific G protein-coupled receptors (GPCRs) and mitochondrial caseinolytic protease P (ClpP), in an effort to produce cancer cell death. The imipridone chemical scaffold provides an opportunity to target GPCRs and ClpP with differential specificity and function. This presents an opportunity to develop potential imipridone therapies broadly within cancer and in other diseases as well.

ONC201 selectively targets Dopamine Receptor D2 (DRD2) and ClpP. ONC201 has selectively induced cell death in cancer by binding to and differentially altering activity of DRD2 and ClpP.

Clinical trials of ONC201 in glioma patients with the H3 K27M-mutation are underway at several locations in the U.S. As many as 10% of patients with glioma have the H3 K27M-mutation. The H3 K27M-mutation is found in 50-90% of patients with midline glioma, including 80-90% of children with diffuse intrinsic pontine glioma or DIPG. Currently there is no effective therapy for patients with the H3 K27M-mutation beyond radiation that provides only transient benefit in a fraction of the population. Often it is not possible to resect these tumors and chemotherapy is ineffective. The median overall survival following progression from first-line therapy is approximately 8 months.

Based on discussions with the FDA, we plan to integrate data from ongoing ONC201 trials into a registration cohort with the potential for an NDA submission seeking accelerated approval. The 50 subject registration cohort includes patients meeting the following eligibility criteria: greater than 2 years of age with recurrent diffuse midline glioma whose tumors harbor the H3 K27M-mutation, evidence of measurable disease, completion of prior radiation that was at least 90 days from starting ONC201 and evidence of progressive disease, amongst other criteria. The primary endpoint of the study is Overall Response Rate (ORR)

assessed by Response Assessment in Neuro-Oncology high-grade glioma (RANO-HGG) criteria. Below is an interim response summary, which shows a meaningful durability of response among those subjects that respond to therapy.

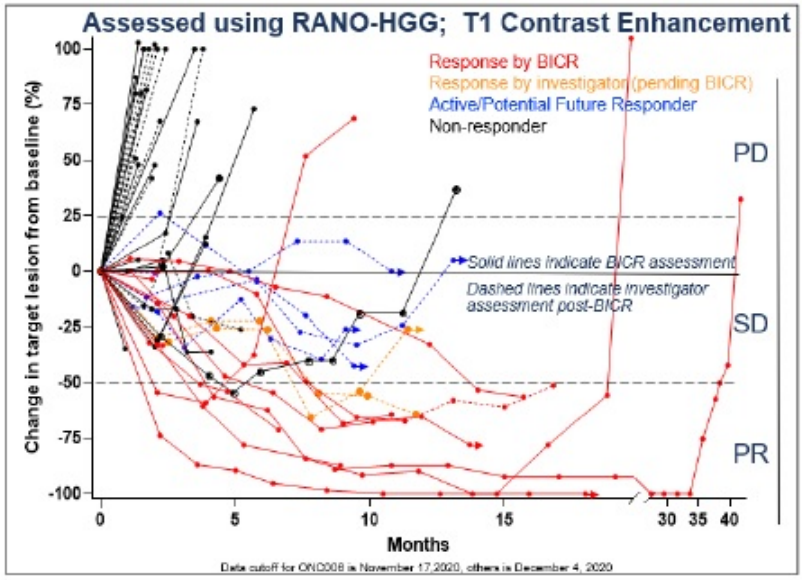


Figure 1: Waterfall plot reflects 47 subjects; 3 subjects did not have on-treatment tumor assessments available but were reported by investigator to have progressive disease. Some eligibility and response data were based on unlocked CRFs that remain subject to change with additional monitoring. PR is partial response, SD is stable disease and PD is progressive disease.

A Blinded Independent Central Review (BICR) analysis of the ORR is expected to take place in 2021 which, if favorable, may form the basis for an NDA submission seeking accelerated approval of ONC201 in the United States. ONC201 has been generally well tolerated across a database of over 350 glioma patients. The most commonly reported adverse events (AEs) were nausea/vomiting, fatigue and decreased lymphocyte counts. Dose limiting toxicities have not been observed with weekly dosing in any indication.

The FDA has granted ONC201 Fast Track Designation for the treatment of adult recurrent H3 K27M-mutant high-grade glioma, Rare Pediatric Disease Designation for treatment of H3 K27M-mutant glioma, and Orphan Drug Designations for the treatment of glioblastoma and for the treatment of malignant glioma.

In addition to clinical trials in glioma, ONC201 is also being studied in an ongoing investigator-initiated Phase 2 trial in neuroendocrine tumors at the Cleveland Clinic. Interim investigator assessments as of a cutoff date of August 20, 2020 showed investigator assessed objective responses in paraganglioma which are adrenal-related tumors that are known to harbor elevated DRD2 expression and dopamine secretion.

ONC206

ONC206 is a DRD2 antagonist and ClpP agonist that demonstrated enhanced non-competitive DRD2 antagonism relative to ONC201 in preclinical studies and additionally showed disruption of DRD2 homodimers. Treatment of tumor cells with ONC206 elicits a distinct gene expression as compared to ONC201. ONC206 has demonstrated synergistic in vitro activity with ONC201 in cells that have acquired resistance to ONC201. ONC206 showed anti-tumor activity in preclinical models of difficult-to-treat neuroendocrine tumors and high-grade gliomas. In vitro, ONC206 has affected some of the same downstream pathways as ONC201, including activation of the integrated stress response and inhibition of Ras signaling, leading to selective killing of tumor cells.

The first-in-human clinical trial of ONC206 for adults with recurrent primary central nervous system tumors is ongoing at the National Institute of Health (NCT04541082).

ONC212

ONC212 is an investigational agonist of the orphan GPCR tumor suppressor GPR132, as well as ClpP. Similar to the potential downstream effects of ONC201 and ONC206, in vitro studies of ONC212 demonstrate activation of integrated stress response, inhibited Ras signaling and selectively killed tumor cells. ONC212 showed broad-spectrum activity across both solid tumors and hematological malignancies, including pancreatic cancer and leukemias prioritized as target clinical indications that exhibit high GPR132 and/or ClpP expression.

Currently ONC212 is in IND-enabling studies. If warranted by IND-enabling studies, first-in-human trials are expected to be conducted in collaboration with MD Anderson Cancer Center and Brown University.

Dociparstat sodium (DSTAT)

In July 2019, we entered into a Development and License Agreement, or the License Agreement, with Cantex Pharmaceuticals (Cantex), pursuant to which we acquired exclusive worldwide rights to develop and commercialize DSTAT for all indications; the planned lead indication is for the first line treatment of acute myeloid leukemia (AML) in combination with cytotoxic chemotherapy. Under the terms of the License Agreement, we are responsible for, and bear the costs of, worldwide development and commercialization of DSTAT. As consideration for the exclusive license, Cantex received an upfront payment of $30.0 million and 10.0 million shares of Chimerix stock. Cantex is also eligible to receive milestone payments up to $202.5 million upon the receipt of product approvals in the United States, the European Union and Japan and sales milestone payments up to $385 million upon achievement of specified net sales levels. We also agreed to pay Cantex tiered royalties based on percentage of net sales beginning at 10% and not to exceed the high teens.

DSTAT for First-Line Acute Myeloid Leukemia (AML)

DSTAT is a is a novel therapeutic candidate which inhibits the activities of key proteins implicated in the resistance of AML blasts and leukemic stem cells (LSCs) to chemotherapy (e.g., CXCL12, HMGB1, Human Leukocyte Elastase (HLE)). DSTAT also inhibits platelet factor 4 (PF4), which has been demonstrated to play a key role in the maintenance of hematopoietic stem cell (HSC) quiescence and impairment of platelet recovery after chemotherapy.

Collectively, DSTAT's inhibition of these proteins has the potential to benefit patients in three ways:

- Inhibit mechanisms of chemoresistance in AML blasts
- Increase chemosensitivity of leukemic stem cells (LSCs)
- Accelerate platelet recovery following chemotherapy

Preliminary evidence of DSTAT efficacy was demonstrated in a randomized, controlled, Phase 2b, dose-finding study (NCT02873338) evaluating DSTAT in combination with standard 7+3 chemotherapy vs chemotherapy alone in 75 participants ≥60 years of age with newly diagnosed AML. Observed overall survival (OS) was longer in the DSTAT group (median not reached; median follow-up for survivors was 20 months) than the control group (median 11.7 months [95% CI: 7.6, nc]) (observed hazard ratio [HR] 0.68 [95% CI: 0.29, 1.57]). A subset analysis of participants meeting the target inclusion criteria for the planned Phase 3 study demonstrated a favorable observed HR for DSTAT (N=20) vs control (N=19) for OS of 0.51 [95% CI: 0.19, 1.42]. Combination treatment with 7+3 chemotherapy and DSTAT did not show increased toxicity compared with 7+3 chemotherapy alone, nor did it prolong time to platelet or neutrophil recovery.

The improved outcomes seen in patients given DSTAT combined with chemotherapy may be due to DSTAT inhibition of key proteins resulting in sensitization of low abundance resistant AML blasts and quiescent LSCs to cell cycle-dependent

chemotherapies. The potential impact on relapse of a deeper and more durable response to chemotherapy treatment is represented graphically in the figure below.

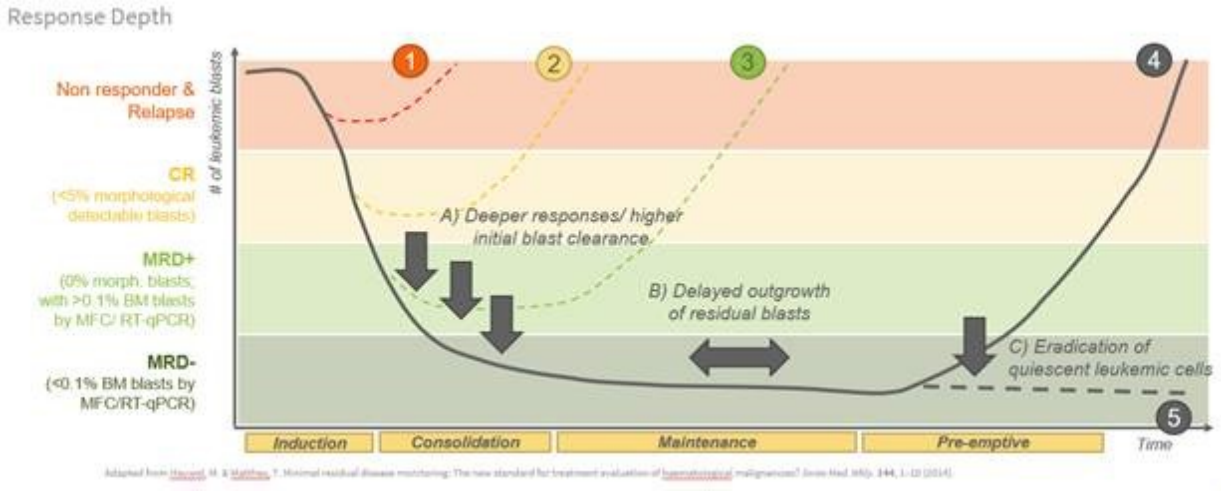


Figure 1: Schematic representation of leukemic cell counts over time. *In the above hypothetical chart, Patients 2 through 5 are all assumed to achieve a complete response or CR (<5% AML blasts in bone marrow based on morphology); however, their long-term response varies from a relatively quick relapse to a potential cure. Measurable residual disease or MRD is a more sensitive analysis of blasts than CR (e.g., 0.1% cutoff for MRD by flow cytometry is typical vs 5% for CR by morphology)*

The mechanism of DSTAT efficacy is likely based on the inhibition of multiple proteins involved in chemoresistance and quiescence. This multi-modal mechanism of action may be particularly beneficial in a disease with significant heterogeneity like AML and may provide an advantage relative to other therapies with singular targets (e.g., CXCR4 inhibitors, E-selectin inhibitors).

DSTAT interaction with the key targets may provide a deeper and more durable response to chemotherapy treatment in AML patients without significant additional toxicity compared to chemotherapy alone.

In 2020, we conducted an end of Phase 2 meeting with the FDA related to the Company's development of DSTAT in AML. Following the meeting, we incorporated FDA's feedback into the full protocol. We recently opened clinical trial sites and are ready to begin screening patients for our 570-subject Phase 3 **D**ociparstat in **A**ML with **S**tandard C**h**emotherapy (DASH AML) study of DSTAT for the treatment of AML.

DASH AML is a randomized, double-blinded trial of approximately 570 newly diagnosed AML patients. The trial will include patients 60 years of age and older who have an intermediate or adverse genetic risk profile. It will also include patients between 18 and 60 years old who have an adverse genetic risk profile. Patients will be randomized 1:1 to receive DSTAT in combination with standard cytarabine plus anthracycline (7+3) induction and cytarabine consolidation chemotherapy or will receive standard of care (7+3) induction and consolidation chemotherapy alone. Patients with FLT-3 mutations will be allowed in the study and will be eligible to receive midostaurin.

The primary endpoint of the trial is overall survival (OS). In addition, the FDA has indicated that event-free survival (EFS) using complete response with hematologic recovery to define induction success (CR) may be acceptable as an endpoint for regulatory approval. Other endpoints to be evaluated in the proposed trial include: MRD, relapse-free survival (RFS), time to hematologic recovery, and induction response.

In order to supplement the previously reported data from pilot and Phase 2 studies and provide additional evidence regarding DSTAT's potential mechanism of action, the proposed Phase 3 trial includes an early assessment of comparative CR and MRD rates among the first 80 evaluable patients. A recently published meta-analysis of 81 separate studies covering 11,151 patients (Short, et. al., Journal of the American Medical Association Oncology, October 8, 2020) has suggested a link between MRD status and outcomes in patients with AML. Specifically, this large cohort meta-analysis showed that MRD-negative AML patients experience superior 5-year disease-free survival (average hazard ratio: 0.37) and 5-year overall survival (average hazard ratio: 0.36) rates when compared to patients that are MRD-positive. This study suggests that evaluation of MRD status

in AML patients may allow for an earlier assessment of therapeutic effects and could lead to acceleration in the development of novel AML therapeutics.

The data from the first 80 evaluable patients of the proposed Phase 3 trial are expected to be unblinded, reported publicly, and available for ongoing analysis of later endpoints, unless the independent Data Monitoring Committee (DMC) determines that exceptional pre-specified thresholds have been achieved, in which case the DMC will have the discretion to maintain blinding, which would allow inclusion of these patients in the final analysis.

DSTAT has received Orphan Drug and Fast Track designation from the U.S. Food and Drug Administration (FDA) for the treatment of AML.

DSTAT for the Treatment of Acute Lung Injury (ALI) in COVID-19 Patients

DSTAT is a low anticoagulant heparin derivative which has been shown to modify several key drivers of inflammation and aberrant thrombosis. DSTAT's proposed mechanism of action is multimodal and may involve inhibition of several proteins (HMGB1, PF4, and P-selectin). These proteins are involved in the hyperinflammation and coagulopathy associated with severe COVID-19, suggesting DSTAT is uniquely positioned as a candidate treatment to address these important aspects of COVID-19 pathophysiology that contribute to high morbidity and mortality.

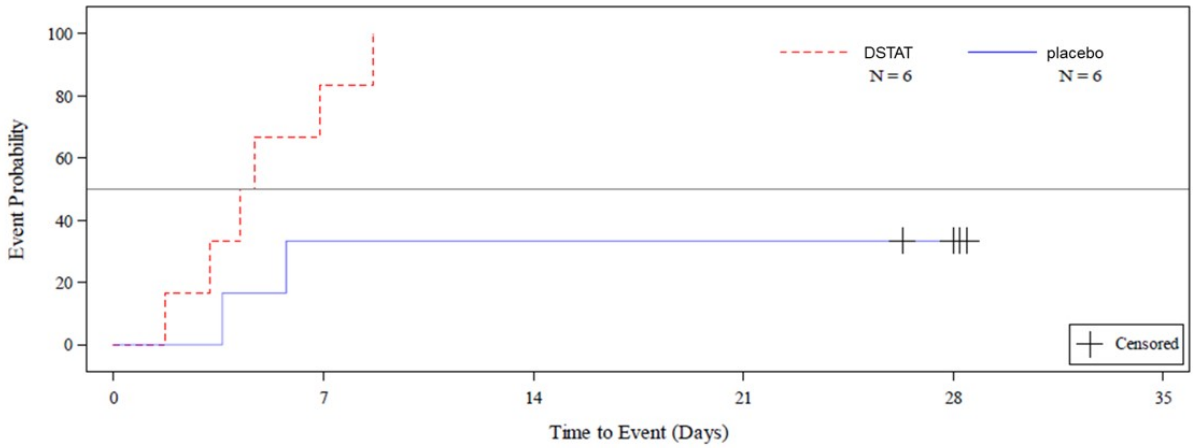
In April 2020, we announced the initiation of a Phase 2/3 study of DSTAT in patients with acute lung injury (ALI) from COVID-19. The study is a randomized, double-blind, placebo-controlled, Phase 2/3 trial to evaluate the safety and efficacy of DSTAT in adults with severe COVID-19 who are at high risk of respiratory failure. Eligible subjects will be those with confirmed COVID-19 who require hospitalization and supplemental oxygen therapy. The primary endpoint of the study is survival without the need for mechanical ventilation through day 28. Additional endpoints include time to improvement as assessed by the National Institute of Allergy and Infectious Disease (NIAID) ordinal scale, time to hospital discharge, time to resolution of fever, number of ventilator-free days, all-cause mortality, and changes in key biomarkers (e.g., IL-6, TNF-α, HMGB1, C-reactive protein and d-dimer).

The Phase 2 portion of the study will enroll 24 subjects (12 subjects in each of 2 cohorts with different doses) to determine the maximum tolerated dose and will then expand to a third cohort consisting of approximately 50 patients (74 total) at the selected dose. A formal analysis of all endpoints, including supportive biomarkers will be performed at the conclusion of the Phase 2 portion of the study. Contingent upon positive results from the Phase 2 portion, the Phase 3 portion of the study will enroll approximately 450 subjects. This study is currently enrolling. Due to the complex and rapidly changing landscape of COVID infection rates and institutional standard of care, we cannot predict with certainty when we will complete Phase 2 enrollment. The study protocol allows for the review of data by cohort.

Topline Results from First Cohort

We have completed enrollment of the first and second cohorts of our DSTAT trial in COVID-19 patients. An analysis of the first cohort that enrolled 12 patients randomized 1:1 was conducted. One patient on DSTAT was ventilated and recovered. Two patients on placebo progressed to ventilation and died, one on day two and the other post day 28. No deaths were reported in patients on the DSTAT arm.

A secondary endpoint of the study was the proportion of patients who achieved at least a two-point improvement in the NIAID ordinal scale, an assessment of clinical status. All six DSTAT patients met the improvement criteria compared to two of the six placebo patients as shown in the Kaplan-Meier curve below.



Of note, on day 28 three of the six placebo patients remained hospitalized and one had died. At day 28, one DSTAT patient was hospitalized. Two DSTAT patients who were discharged were subsequently lost to follow-up.

No patients on DSTAT had elevated values for IL-6, MCP-1 or D-dimer on therapy, but two patients on placebo had substantial increases in all of these biomarkers by day five. One of these placebo patients developed Acute Respiratory Disease Syndrome and died after day 28 while the other suffered a pulmonary embolism and recovered. These biomarkers are reflective of the lung inflammation and thrombotic complications associated with severe COVID-19, and these findings are consistent with the proposed mechanism of action for DSTAT.

DSTAT was observed to be generally safe and well tolerated. No patients on the DSTAT arm discontinued study treatment for adverse events compared to two patients on the placebo arm.

First Cohort Demographics

As an enrollment criterion, all patients were hospitalized with confirmed COVID-19 infection and required supplemental oxygen; some patients required more intensive supplemental oxygen (noninvasive ventilation/high-flow oxygen) which is generally associated with more severe disease.

Five of the six patients on the placebo arm required noninvasive ventilation/high-flow oxygen at baseline, compared to two of the six patients on the DSTAT arm. The median age of patients in cohort one was 63.0 years on the placebo arm and 50.5 years on the DSTAT arm. These random imbalances may favor the DSTAT arm.

The DSTAT arm was comprised of six males. The placebo arm was comprised of four males and two females. Being male has been associated with a higher risk of COVID-19 mortality.

Second Cohort Enrollment Complete

The Phase 2 portion of the study enrolled two cohorts of 12 patients each to confirm the maximum safe dose with reviews by the Data Safety Management Board (DSMB) after completion of each cohort. The second cohort is fully enrolled and the data will be compiled for review by the DSMB. Following review, the DSMB will recommend a dose for the third cohort which will include approximately 50 additional patients (74 total). A formal analysis of all endpoints, including supportive biomarkers will be performed at the conclusion of the third cohort, completing the Phase 2 portion of the study. Contingent upon positive results, the Phase 3 portion of the study will enroll approximately 450 patients.

Our Strategy

The principal components of our business strategy are to:

- **Deliver BCV, as a countermeasure for smallpox, to the Strategic National Stockpile (SNS).** In 2020, we submitted an NDA for BCV tablet and an NDA for BCV suspension for the treatment of smallpox. In December 2020, we received notification from the FDA of an April 7, 2021 PDUFA date related to our submissions.
- **Develop ONC201 for recurrent H3 K27M-mutant glioma.** ONC201 is currently being evaluated in a registrational program for recurrent H3 K27M-mutant Glioma. Upon full maturation of the data, an evaluation by BICR of a 50-subject registrational cohort is expected later this year. If favorable, this data may form the basis for an accelerated regulatory approval of ONC201 in the United States. In addition to clinical data support preparation, we are also working on drug product and clinical pharmacology support of ONC201 necessary for a pre-NDA meeting. As we gather more information, we expect to have a better understanding of the possible timeframes in which a pre-NDA meeting could take place.
- **Develop DSTAT for AML.** Following an end of Phase 2 meeting with the FDA in early 2020, we have incorporated FDA's feedback on key elements of a proposed Phase 3 trial in first-line AML patients and have since finalized the protocol with the FDA. In early 2021, we initiated, DASH AML, a Phase 3 trial with a targeted full enrollment of approximately 570 patients with DSTAT in combination with standard chemotherapy (cytarabine plus anthracycline or “7+3”) in newly diagnosed AML patients. The primary endpoint of the trial is overall survival (OS). The FDA has indicated that event-free survival (EFS) using complete response with hematologic recovery to define induction success (CR), is acceptable as an endpoint for regulatory approval. Other endpoints to be evaluated in the proposed trial include: measurable residual disease (MRD), relapse-free survival (RFS), time to hematologic recovery, and induction response. In order to supplement the previously collected data from the pilot and Phase 2 trials and provide additional evidence of DSTAT’s mechanism of action, the Phase 3 trial includes an early assessment of comparative CR and MRD rates among the first 80 evaluable patients. This data is expected to be unblinded, reported publicly, and available for ongoing analysis of later endpoints. Prior to potential unblinding, this data will be reviewed by an independent DMC. The DMC will have the discretion to maintain blinding of the data from this early assessment in the event the DSTAT arm shows exceptional advantages to the control arm on CR and MRD, at certain pre-specified thresholds, which would allow inclusion of these patients in the final analysis.
- **Develop DSTAT for ALI.** In 2020 we initiated a Phase 2/3 study of DSTAT in patients with acute lung injury (ALI) from COVID-19. We have completed enrollment of cohorts 1 and 2 of the Phase 2 portion of the study, cohort 3 will initiate after the DMC meets to review initial safety data from cohort 2. The primary endpoint of the study is the proportion of subjects who survive and do not require mechanical ventilation through day 28. Additional endpoints include time to improvement as assessed by the National Institute of Allergy and Infectious Disease ordinal scale, time to hospital discharge, time to resolution of fever, number of ventilator-free days, all-cause mortality, and changes in key biomarkers (e.g. IL-6, TNF-α, HMGB1, C-reactive protein and d-dimer). The Phase 2/3 study includes an assessment of all endpoints and supportive biomarkers in Phase 2 to decide whether to continue to the Phase 3 portion of the study.
- **Seek opportunities to in-license other development programs.** We continue to review transactions designed to build our product candidate pipeline, including, but not limited to, merger or acquisition transactions, issuing or transferring shares of common stock, or the license, purchase or sale of specific assets, in addition to other potential actions aimed at maximizing stockholder value. There can be no assurance that this review will result in the identification or consummation of any additional transaction.

Significant Agreements

BARDA

In February 2011, we entered into a contract with the Biomedical Advanced Research and Development Authority (BARDA) for the advanced development of brincidofovir as a medical countermeasure in the event of a smallpox release. BARDA is a division of the U.S. Department of Health and Human Services (DHHS) in the Office of the Assistant Secretary for Preparedness and Response that supports the advanced research and development, manufacturing, acquisition and stockpiling of medical countermeasures. The scope of work for the contract includes preclinical, clinical and manufacturing development activities that fall into the following areas: non-clinical animal efficacy studies; clinical activities; manufacturing activities; and all associated regulatory, quality assurance, management, and administrative activities.

Under the contract, BARDA reimburses our costs, plus pays us a fixed fee, for the research and development of brincidofovir as a treatment of smallpox infections. The contract consists of an initial performance period, referred to as the base performance

segment which ended on May 31, 2013, plus up to four extension periods, referred to as option segments, each of which may be exercised at BARDA's sole discretion. We must complete agreed upon milestones and deliverables in each discrete work segment before the next option segment is eligible to be exercised. Under the contract as currently in effect, if each follow-on option segment is exercised by BARDA, we may receive up to $75.8 million in expense reimbursement and $5.3 million in fees.

We substantially completed the first option segment of the contract on August 28, 2014. In September 2014, we were awarded a contract extension for a second option segment providing an additional $17.0 million. In August 2016, the contract was amended to provide an additional $535,000, in December 2017 the contract was amended to increase funding by an additional $4.1 million, and in January 2019 the contract was amended to increase funding by an additional $2.3 million for the performance of the second option segment. The second option segment was completed on August 20, 2020. On September 11, 2015, BARDA exercised the third option segment, which provided approximately $12.9 million in funding for the performance of the segment. In December 2017, BARDA decreased the scope of this segment by removing a potential second pivotal ectromelia virus study which decreased the funding of this option segment by $1.3 million to a total award of $11.6 million; the third option segment was completed on August 20, 2020. On June 17, 2020, BARDA exercised the fourth option segment, which provided approximately $4.6 million in funding for the performance of the segment. Of the $75.8 million expense reimbursement and $5.3 million in fees that we may receive, approximately $78.9 million in expense reimbursement and fees has been funded. As of December 31, 2020, of the $78.9 of total funding, we had invoiced an aggregate of $75.5 million with respect to the base performance segment and four option segments.

Pursuant to the contract, Chimerix and the U.S. government share the rights to any inventions made in the performance of our work under the contract. Specifically, the U.S. government retains a nonexclusive, nontransferable, irrevocable, paid up license to any invention made in the performance of our work under the contract, provided, however, that the U.S. government may, under certain circumstances, including circumstances involving public health and safety, license such inventions to third parties without our consent. There have been no inventions made to date under the BARDA contract.

The contract may be terminated by BARDA ten days after giving us notice of a material default which remains uncured for ten days. In addition, BARDA is also permitted under applicable law to terminate the contract if it is in the U.S. government's best interest.

There are no RFPs for procurement of a smallpox antiviral pertaining to brincidofovir that are currently pending.

In the event a new RFP is issued we will likely submit a proposal. In the event that our proposal is chosen (potentially among several competing proposals) and before we can enter into a contract we must negotiate its terms, including the price and delivery schedule. In addition, as a governmental agency, BARDA's ability to enter into a contract is subject to continued funding for this purpose, which can change at any time.

License and Development Agreement with Cantex Pharmaceuticals, Inc.

On July 26, 2019, the Company entered into a License and Development Agreement with Cantex pursuant to which the Company acquired exclusive worldwide rights to develop and commercialize, for any and all uses, a glycosaminoglycan compound known as DSTAT, which is currently being studied for the treatment of acute myeloid leukemia. Under the terms of the license agreement, the Company is responsible for, and bears the costs of, worldwide development and commercialization of DSTAT. In connection with the transaction, Cantex assigned to the Company all of its rights under its DSTAT supply agreements, including its bulk API agreement with Scientific Protein Laboratories LLC (SPL), pursuant to which SPL will exclusively produce DSTAT for the Company through October 2040.

In consideration for the license rights, the Company made an upfront cash payment of $30.0 million to Cantex and issued to Cantex 10.0 million shares of its common stock. For the twelve months ended December 31, 2019, the Company recognized $65.0 million of acquired in-process research and development expenses for the $30.0 million upfront cash payment, the fair value of the 10.0 million shares of common stock issued to Cantex and $0.1 million of transaction costs. The license agreement obligates the Company to pay Cantex regulatory milestone payments of up to $202.5 million upon receipt of product approvals in the United States, the European Union and Japan, and sales milestone payments of up to $385.0 million upon achievement of specified net sales levels. The Company also agreed to pay Cantex tiered royalties based on percentages of net sales beginning at 10% and not to exceed the high teens.

SymBio Pharmaceuticals

On September 30, 2019, the Company entered into a license agreement with Symbio for the exclusive worldwide rights to develop, manufacture and commercialize BCV for all human indications, excluding the prevention and treatment of orthopoxviruses, including smallpox. Under the terms of the license agreement, SymBio will be responsible for, and bear the future costs of, worldwide development and commercialization of BCV in the licensed indications. Either party may terminate the license agreement upon the occurrence of a material breach by the other party (subject to standard cure periods), or upon certain events involving the bankruptcy or insolvency of the other party. SymBio may also terminate the license agreement without cause on a country-by-country basis upon ninety days' prior notice.

In exchange for the license to BCV rights, the Company received an upfront payment of $5.0 million in October of 2019. In addition, the Company is eligible to receive up to $180.0 million in clinical, regulatory and commercial milestones worldwide, as well as low double-digit royalties and additional milestones based on commercial sales. Since entering into the license agreement in September 2019, the Company has recognized all of the $5.0 million of revenue related to the upfront payment.

Merger Agreement with Oncoceutics Inc, and Fortis Advisors

On January 7, 2021, we entered into an agreement with the securityholders of Oncoceutics and Fortis Advisors (as securityholders representative) to acquire Oncoceutics, a privately-held, clinical-stage biotechnology company developing imipridones, a novel potential class of compounds. As consideration for the acquisition, we (a) paid an upfront cash payment of approximately $25.0 million, (b) issued an aggregate of 8,723,769 shares of our common stock, (c) issued a promissory note to the representative of the securityholders of Oncoceutics in the principal amount of $14.0 million, to be paid in cash, upon the one year anniversary of the closing of the acquisition, and (d) agreed to make contingent payments up to an aggregate of $360.0 million based on the achievement of certain development, regulatory and commercialization events, as well as additional tiered royalty payments based upon future net sales of ONC-201 and ONC-206 products, subject to certain reductions, and a contingent payment in the event we receive any proceeds from the sale of a rare pediatric disease priority review voucher based on the Oncoceutics products. We have also passed through to the Oncoceutics securityholders the upfront payment received from China Resources Sanjiu Medical & Pharmaceutical Co., Ltd. pursuant to a license agreement entered into with Oncoceutics prior to the acquisition. The closing payment may be adjusted after the closing, pursuant to procedures, in connection with the finalization of the cash, transaction expenses, debt and working capital amounts at closing. Pursuant to the merger agreement we have certain diligence obligations with respect to further development and commercialization of the Oncoceutics product candidates.

Commercial Operations

In 2020, we submitted an NDA for BCV tablet and an NDA for BCV suspension for the treatment of smallpox. In December, 2020, we received notification from the FDA of an April 7, 2021 PDUFA date related to our submissions. The U.S. government is the largest source of development and procurement funding for academic and biopharmaceutical companies contracting biodefense research or developing vaccines, anti-infectives and immunotherapies directed at potential agents of bioterror or biowarfare. U.S. government spending on biodefense programs includes development funding awarded by the National Institute of Allergy and Infectious Diseases, BARDA and the Department of Defense (DoD), and procurement of countermeasures by BARDA, the Centers for Disease Control and Prevention and the DoD. In addition to the U.S. government, we believe that potential additional markets for the sale of biodefense countermeasures include:

- foreign governments, including both defense and public health agencies;
- non-governmental organizations and multinational companies, including transportation and security companies;
- healthcare providers, including hospitals and clinics; and
- state and local governments, which may be interested in these products to protect, among others, emergency responders, such as police, fire and emergency medical personnel.

If BCV is approved by the FDA, it is not expected to be approved for sale beyond the Strategic National Stockpile. The Company would likely need to meet additional regulatory requirements before sales were made in the U.S. beyond the Strategic National Stockpile.

If ONC201 is approved for recurrent H3 K27M-mutant glioma and/or DSTAT is approved for the treatment of AML, we believe it is possible for us to commercialize ONC201 and DSTAT in the United States. We anticipate that commercialization of one or both products would entail a relatively small commercial infrastructure, which may include a contract sales force, partner sales force, or an internally developed commercial organization.

Outside of the United States, subject to obtaining necessary marketing approvals, we may seek to commercialize ONC201 and DSTAT ourselves or through distribution or other collaboration arrangements. If we elect to develop ONC201 for other indications and if DSTAT is also developed for other hematologic indications, we would plan to do so selectively either on our own or by establishing alliances with one or more pharmaceutical company collaborators, depending on, among other things, the applicable indications, the related development costs, reimbursement complexities and our available resources.

Competition

Our industry is highly competitive and subject to rapid and significant technological change. While we believe that our therapeutic experience, scientific and commercial knowledge provide us with competitive advantages, we will face competition from large and small pharmaceutical and biotechnology companies, including specialty pharmaceutical and generic drug companies, and other emerging technologies.

We believe that the key competitive factors that will affect the commercial success of BCV, ONC201, DSTAT and our other product candidates are the efficacy, safety and tolerability profile and the risk-benefit trade-off compared to alternative therapies or procedures. Securing market access and reimbursement will be an important element of product uptake and market penetration. Our commercial opportunity could be negatively impacted if our competitors develop or market products or other technologies that are more effective, better tolerated, safer, more convenient or have greater market access than BCV, ONC201 and DSTAT, or obtain regulatory approval for their products more rapidly than we do. In addition, our ability to compete will be affected by the availability of generic products.

ONC201 is the most clinically advanced program for potentially treating tumors which harbor the H3 K27M mutation in recurrent diffuse midline glioma patients. If approved, treatment with ONC201 is expected to be targeted to patients whose tumor harbors the H3 K27M mutation. There are currently no commercially available treatments that target the H3 K27M mutant patient population.

If approved, ONC201 could compete with a number of existing products, new products in development and possible combination therapies used for brain cancers including generic drugs such as chemotherapy, targeted agents, immunotherapies, and other therapies. Select products that are currently used, or being developed for use, to treat brain cancers include, but are not limited to:

- Systemic therapies approved to treat brain cancer: temozolomide, lomustine, carmustine, everolimus, and bevacizumab
- Tumor-treating fields such as Optune®
- Other investigational agents for the treatment of brain cancer: immunotherapies (CAR-T, durvalumab, VBI-1901, etc), viral therapies (DCVax-L, etc.), targeted agents (panobinostat, paxalisib, MDNA55) and other therapies

If approved, DSTAT would compete with a number of existing products, new products in development and other types of combination therapies in development for first line AML including generic drugs such as standard 7+3 (cytarabine plus anthracycline) chemotherapy, alternative non-chemo based therapy regimens and other 7+3 combination therapies that target specific mutations. Select products that are currently used, or being developed for use, to treat AML include but are not limited to:

- Standard 7+3 (cytarabine plus anthracycline) with or without targeted agents (including but not limited to the experimental treatment uproleselan, Mylotarg®, IDH1 and IDH2 inhibitors (enasidenib and ivosidenib), FLT-3 inhibitors (midostaurin and gilteritinib), and other targeted agents such as gemtuzumab, glasdegib, and venetoclax));
- Vyxeos® and combinations with Vyxeos;
- Hypomethylating agents or low dose cytarabine with or without venetoclax; and
- Other consolidation and maintenance therapies (including hypomethylating agents, venetoclax, and stem cell transplantation).

Clinical trials with these alternatives have the potential to compete for and thus slow enrollment in the DSTAT clinical development program, with resulting impacts on the time to Phase 3 results (and thus time to market). Competition for patients and/or evolutions in the standard of care could render the completion of Phase 3 clinical development not feasible. Even if DSTAT clinical trials are successful, we anticipate that we will face intense and increasing competition as new products enter the market, as advanced technologies become available and as increasing numbers of generic formulations of currently branded products become available.

Changes in the health care system may limit our ability to price BCV, ONC201, DSTAT and our other product candidates at a level that would allow recovery of our research and development costs and may impede our ability to generate or maintain a profit.

We believe that BCV, ONC201, and DSTAT have potential benefits over existing and potential competitive products as described in more detail under "Business - ONC201", "Business - Dociparstat sodium" and "Business - Brincidofovir", respectively. As a result, we believe that these products should be well positioned to gain adoption if we obtain the required regulatory approvals. However, even with those benefits, we may not be able to make promotional claims that these products are superior to competing products without conducting additional studies, which delivers differentiated data. See "Risk Factors - Risks Related to Commercialization of Our Product Candidates."

Our Intellectual Property

We strive to protect and enhance the proprietary technologies we believe are important to our business, including by seeking and maintaining patents intended to cover our products and compositions, their methods of use and any other inventions that are important to the development of our business. We also rely on trade secrets to protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection.

Our success will depend significantly on our ability to obtain and maintain patent and other proprietary protection for commercially important technology, inventions and know-how related to our business, defend and enforce our patents, maintain licenses to our intellectual property owned by third parties, preserve the confidentiality of our trade secrets and operate without infringing the valid and enforceable patents and proprietary rights of third parties.

Antiviral Patent Portfolio

At February 15, 2021, our worldwide antiviral patent portfolio included:

- 74 patents or patent applications that we own or have in-licensed from academic institutions, related to brincidofovir, and other antivirals, which represented a decrease over the number of patents in our patent portfolio at the end of fiscal year 2019;
- This includes 53 US and foreign exclusively and jointly owned patents and 21 US and foreign applications related to brincidofovir, and other antivirals. Granted European and Eurasian patents are counted as one patent and have been validated throughout Europe and Eurasia;
- Four jointly-owned patents and two jointly-owned patent applications related to our agreement with UM regarding our proprietary Chemical Library; and
- One US and one European patent application exclusively owned by Chimerix directed to a morphic form of a compound from the Chemical Library.

In 2015, U.S. Patent No. 8,962,829 covering a method of synthesis and the commercial morphic form of brincidofovir was issued to Chimerix. With the addition of this patent, composition of matter coverage for brincidofovir in the U.S. is expected to extend to October 2034, excluding any additional term from patent term adjustments or patent term extensions.

DSTAT Patent Portfolio

- 40 patents or patent applications that we own or have in-licensed from Cantex, related to DSTAT;
- This includes 24 US and foreign issued patents and 16 pending US and foreign applications related to DSTAT;
- Patent protection for DSTAT is expected to extend through 2033, with the potential for 2038 in the U.S. in the event of full patent term restoration.

Oncoceutics Patent Portfolio

- 156 patents or patent applications related to imipridones that we have acquired rights to through our merger with Oncoceutics, Inc. (owned or in-licensed by Oncoceutics);
- This includes 29 US and foreign issued patents and 70 pending US and foreign applications related to ONC201;
- Patent protection for ONC201's lead indication is expected to extend into 2037 in the U.S., with the potential for 2042 in the U.S. in the event of full patent term restoration.

Patents generally have a term of twenty years from the date they are filed. As our patent portfolio has been built over time, the remaining terms of the individual patents across our patent portfolio vary. We believe that our patents and patent applications are important for maintaining the competitive differentiation of our lipid-antiviral-conjugate technology platform and the Chimerix Chemical Library, enhancing our freedom of action to sell our antivirals, upon appropriate regulatory approvals, in markets in which we choose to participate, and maximizing our return on research and development investments. No single patent is in itself essential to the conduct of our business as a whole.

We also seek to expand our intellectual property portfolio through licensing intellectual property from third parties as we deem appropriate. We have granted, and will continue to grant to others, licenses under our patents when we consider these arrangements to be in our interest.

Manufacturing

We do not own or operate, and we do not expect to own or operate, facilities for product manufacturing, storage and distribution, or testing. In the past, we have relied on third-party manufacturers for supply of our product candidates, ONC201, DSTAT and BCV, as well as our other product candidates.

We expect that in the future we will rely on such manufacturers for supply of drug substance and drug product that will be used in clinical trials of DSTAT, our expanded access program for ONC201 and other clinical trials as well as for commercial purposes should ONC201, DSTAT or BCV be approved. In July 2019, we were assigned Cantex's rights under a supply agreement with Scientific Protein Labs (SPL) pursuant to which SPL will exclusively produce DSTAT drug substance for us through October 2040 (the Supply Agreement). We have agreed that SPL will be our exclusive provider of DSTAT during the term of the Supply Agreement. In addition, in July 2019 we were assigned Cantex's rights under a supply agreement with Pyramid Laboratories Inc. (Pyramid) pursuant to which Pyramid will provide DSTAT finished drug product to us. When produced on a commercial scale, we expect that cost-of-goods-sold relating to ONC201, DSTAT and BCV will generally be in-line with that of other targeted oncology therapies, heparin-derived molecules and small-molecule pharmaceutical compounds, respectively.

The manufacturing process for brincidofovir drug substance is relatively straight-forward and generally in-line with other small molecule pharmaceutical compounds in terms of cost and complexity. The process is robust and reproducible, does not require dedicated reactors or specialized equipment, uses common synthetic chemistry and readily available materials, including off-the-shelf and made-to-order starting materials, and is readily transferable.

Our current drug substance supply chain for brincidofovir involves various contractors that supply the raw materials for the drug substance process, a contract manufacturer for an intermediate, and a contract manufacturer for the drug substance. We have a validated large-scale drug substance manufacturing process at our selected contractor that will produce the potential procurement supply of drug substance. Manufacturers of drug components must meet certain FDA qualifications with respect to manufacturing standards. At present, we have qualified only one firm as a supplier of drug substance. We continually assess our manufacturing needs and may seek to engage additional qualified vendors as circumstances dictate. Changes in our requirements may require revalidation of the manufacturing process at a different scale and potentially at a different contractor depending on the necessary scale, infrastructure and technical capabilities. To ensure continuity in our supply chain, we plan to establish supply arrangements with alternative suppliers for certain portions of our supply chain, as appropriate.

Our BCV drug products (tablets and oral suspension) are also manufactured by contract development and manufacturing organizations (CDMOs). The CDMOs must meet certain FDA qualifications with respect to manufacturing standards. Manufacturers for each product have been selected and qualified with registration and validation batches to support NDA marketing applications with the FDA. In addition, scale up of both the tablet and suspension products is in progress that will produce potential procurement supplies.

Manufacturing is subject to extensive regulations that impose various procedural and documentation requirements, which govern record keeping, manufacturing processes and controls, personnel, quality control and quality assurance, among others. Our systems and contractors are required to be in compliance with these regulations, and this is assessed regularly through monitoring of performance and a formal audit program. We have personnel with extensive technical, manufacturing, analytical and quality experience and strong project management discipline to oversee contract manufacturing and testing activities, and to compile manufacturing and quality information for our regulatory submissions.

Government Regulation and Product Approval

Government authorities in the United States, at the federal, state and local level, and government authorities of member states of the EU and other countries extensively regulate, among other things, the research, development, testing, manufacture, quality control, approval, labeling, packaging, storage, record-keeping, promotion, advertising, distribution, post-approval monitoring and reporting, marketing and export and import of products such as those we are developing. Any product candidate that we develop must be approved by the FDA or EMA before it may be legally marketed in the United States or EU and in other countries by the responsible national regulatory agency before it may be legally marketed.

U.S. Drug Development Process

In the United States, the FDA regulates drugs under the Federal Food, Drug and Cosmetic Act (FDCA), and implementing regulations. Drugs are also subject to other federal, state and local statutes and regulations. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources. Failure to comply with the applicable U.S. requirements at any time during the product development process, FDA approval process or after FDA approval, may subject an applicant to administrative or judicial civil or criminal sanctions. FDA sanctions could include refusal to approve pending applications, withdrawal of an approval, clinical hold, warning letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, debarment, restitution, disgorgement or civil or criminal penalties. Any agency or judicial enforcement action, whether before or after the FDA approval process, could have a material adverse effect on us. The process required by the FDA before a drug may be marketed in the United States generally involves the following:

- completion of nonclinical laboratory tests, animal studies and formulation studies according to good laboratory practices (GLP), or other applicable regulations;
- submission to the FDA of an application for an IND, which must become effective before human clinical trials may begin;
- performance of adequate and well-controlled human clinical trials according to the FDA's regulations commonly referred to as current good clinical practices (GCPs), to establish the safety and efficacy of the proposed drug for its intended use;
- submission to the FDA of a NDA for a new drug;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities where the drug is produced to assess compliance with the FDA's current good manufacturing practice standards (cGMP), to assure that the facilities, methods and controls are adequate to preserve the drug's identity, strength, quality and purity;
- potential FDA inspection of the nonclinical and clinical trial sites that generated the data in support of the NDA; and FDA review of the NDA.

The lengthy process of seeking required approvals and the continuing need for compliance with applicable statutes and regulations require the expenditure of substantial resources and approvals are inherently uncertain.

Before testing any compounds with potential therapeutic value in humans, the drug candidate enters the preclinical testing stage. Preclinical tests, also referred to as nonclinical studies, include laboratory evaluations of product chemistry, toxicity and formulation, as well as animal studies to assess the potential safety and activity of the drug candidate. The conduct of the preclinical tests must comply with federal regulations and requirements including GLP. The sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and a proposed clinical protocol to the FDA as part of the IND. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA places the clinical trial on a clinical hold within that 30-day time period. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. The FDA may also impose clinical holds on a drug candidate at any time before or during clinical trials due to safety concerns or non-compliance. Accordingly, we cannot be sure that submission of an IND will result in the FDA allowing clinical trials to begin, or that, once begun, issues will not arise that suspend or terminate such trial.

Clinical trials involve the administration of the drug candidate to healthy subjects or affected patients under the supervision of qualified investigators, generally physicians not employed by or under the trial sponsor's control. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical trial, dosing procedures, subject selection and exclusion criteria, and the parameters to be used to monitor subject safety. Each protocol must be submitted to the FDA as part of the IND. Patients not meeting protocol inclusion and exclusion criteria may be considered for our expanded access program under the IND. Clinical trials must be conducted in accordance with the FDA's regulations comprising the good clinical practices requirements. Further, each clinical trial must be reviewed and approved by an independent institutional review board

(IRB), at or servicing each institution at which the clinical trial will be conducted. An IRB is charged with protecting the welfare and rights of trial participants and considers such items as whether the risks to individuals participating in the clinical trials are minimized and are reasonable in relation to anticipated benefits. The IRB also approves the form and content of the informed consent that must be signed by each clinical trial subject or his or her legal representative and must monitor the clinical trial until completed.

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

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

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

Annual progress reports detailing the results of the clinical trials must be submitted to the FDA and written IND safety reports must be promptly submitted to the FDA and the investigators for serious and unexpected adverse events or any finding from tests in laboratory animals that suggests a significant risk for human subjects. Phase 1, Phase 2 and Phase 3 clinical trials may not be completed successfully within any specified period, if at all. The FDA or the sponsor or its data safety monitoring board may suspend a clinical trial at any time on various grounds, including a finding that the research subjects or patients 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.

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

U.S. Review and Approval Processes

The results of product development, nonclinical studies and clinical trials, along with descriptions of the manufacturing process, analytical tests conducted on the chemistry of the drug, proposed labeling and other relevant information are submitted to the FDA as part of an NDA requesting approval to market the product. The submission of an NDA is subject to the payment of substantial user fees; a waiver of such fees may be obtained under certain limited circumstances.

In addition, under the Pediatric Research Equity Act (PREA), an NDA or supplement to an NDA must contain data to assess the safety and effectiveness of the drug for the claimed indications in all relevant pediatric subpopulations and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The FDA may grant deferrals for submission of data or full or partial waivers. Unless otherwise required by regulation, PREA does not apply to any drug for an indication for which orphan designation has been granted.

The FDA reviews all NDAs submitted to determine if they are substantially complete before it accepts them for filing; this initial review period prior to accepting the NDA for filing is 2 months in duration. Once the submission is accepted for filing, the FDA begins an in-depth review of the NDA. Under the goals and policies agreed to by the FDA under the Prescription Drug User Fee Act (PDUFA), the FDA has 10 months from the date of accepting the NDA for filing in which to complete its initial review of a standard NDA and respond to the applicant, and six months for a priority NDA. The FDA does not always meet its PDUFA goal dates for standard and priority NDAs. The review process and the PDUFA goal date may be extended if the FDA

requests or the NDA sponsor otherwise provides additional information or clarification regarding information already provided in the submission without prior agreement reached at a pre-submission meeting.

After the NDA submission is accepted for filing, the FDA reviews the NDA to determine, among other things, whether the proposed product is safe and effective for its intended use, and whether the product is being manufactured in accordance with cGMP to assure and preserve the product's identity, strength, quality and purity. The FDA may refer applications for novel drug or biological products or drug or biological products which present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions. During the drug approval process, the FDA also will determine whether a risk evaluation and mitigation strategy (REMS), is necessary to assure the safe use of the drug. If the FDA concludes a REMS is needed, the sponsor of the NDA must submit a proposed REMS. The FDA will not approve the NDA without a REMS, if required.

Before approving an NDA, the FDA will inspect the facilities at which the product is manufactured. The FDA will not approve the product unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. Additionally, before approving an NDA, the FDA will typically inspect one or more clinical sites to assure that the clinical trials were conducted in compliance with IND study requirements. If major issues with trial conduct are identified at a site, data collected from that site can be determined to be unacceptable for supporting the application. If the FDA determines that the application, manufacturing process or manufacturing facilities are not acceptable it will outline the deficiencies in the submission and often will request additional testing or information.

The NDA review and approval process is lengthy and difficult and the FDA may refuse to approve an NDA if the applicable regulatory criteria are not satisfied or may require additional clinical data or other data and information. Even if such data and information is submitted, the FDA may ultimately decide that the NDA does not satisfy the criteria for approval. Data obtained from clinical trials are not always conclusive and the FDA may interpret data differently than we interpret the same data. The FDA will issue a complete response letter if the agency decides not to approve the NDA. The complete response letter usually describes all of the specific deficiencies in the NDA identified by the FDA. The deficiencies identified may be minor, for example, requiring labeling changes, or major, for example, requiring additional clinical trials. Additionally, the complete response letter may include recommended actions that the applicant might take to place the application in a condition for approval. If a complete response letter is issued, the applicant may either resubmit the NDA, addressing all of the deficiencies identified in the letter, or withdraw the application.

If a product receives regulatory approval, the approval may be significantly limited to specific diseases and dosages or the indications for use may otherwise be limited, which could restrict the commercial value of the product. Further, the FDA may require that certain contraindications, warnings or precautions be included in the product labeling. In addition, the FDA may require post marketing clinical trials, sometimes referred to as Phase 4 clinical trials testing, which involves clinical trials designed to further assess a drug's safety and effectiveness and may require testing and surveillance programs to monitor the safety of approved products that have been commercialized.

Orphan Drug Designation

Our investigational agent, ONC201 has been granted an orphan drug designation for the treatment of glioblastoma and for the treatment of malignant glioma. DSTAT also has orphan drug designation for the treatment of AML. In addition, BCV has been granted orphan drug designation for the treatment of smallpox. Under the Orphan Drug Act, the FDA may grant orphan designation to a drug or biological product intended to treat a rare disease or condition, which is generally a disease or condition that affects fewer than 200,000 individuals in the United States, or more than 200,000 individuals in the United States and for which there is no reasonable expectation that the cost of developing and making a drug or biological product available in the United States for this type of disease or condition will be recovered from sales of the product. Orphan product designation must be requested before submitting an NDA. After the FDA grants orphan product designation, the identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA. Orphan product designation does not convey any advantage in or shorten the duration of the regulatory review and approval process.

If a product that has orphan designation subsequently receives the first FDA approval for the disease or condition for which it has such designation, the product is entitled to orphan product exclusivity, which means that the FDA may not approve any other applications to market the same drug or biological product for the same indication for seven years, except in limited circumstances, such as a showing of clinical superiority to the product with orphan exclusivity. Competitors, however, may receive approval of different products for the indication for which the orphan product has exclusivity or obtain approval for the

same product but for a different indication for which the orphan product has exclusivity. Orphan product exclusivity also could block the approval of a product for seven years if a competitor obtains approval of the same drug or biological product as defined by the FDA or if a drug candidate is determined to be contained within the competitor's product for the same indication or disease. If a drug or biological product designated as an orphan product receives marketing approval for an indication broader than what is designated, it may not be entitled to orphan product exclusivity.

Expedited Development and Review Programs

The FDA has a number of programs that are intended to expedite or facilitate the process for reviewing new drugs and biological products for serious conditions that meet certain criteria. Specifically, new drugs and biological products are eligible for Fast Track, Breakthrough Therapy, and/or Priority Review designation if they are intended to treat a serious or life-threatening condition and demonstrate the potential to address unmet medical needs for the condition. Fast Track designation applies to the combination of the product and the specific indication for which it is being studied. Our investigational agents, ONC201, DSTAT and BCV, have been granted Fast Track designation. In December 2020, we announced that the FDA had accepted the filing of the NDA for BCV as a medical countermeasure for smallpox, granted Priority Review and set an action date of April 7, 2021 under the Prescription Drug User Fee Act (PDUFA).

Breakthrough Therapy designation is for a drug that is intended to treat a serious condition and preliminary clinical evidence indicates that the drug may demonstrate substantial improvement on a clinically significant endpoint(s) over available therapies.

Unique to Fast Track and Breakthrough Therapy products, the FDA may consider for review sections of the NDA on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the NDA, the FDA agrees to accept sections of the NDA and determines that the schedule is acceptable, and the sponsor pays any required user fees upon submission of the first section of the NDA.

Any product submitted to the FDA for marketing approval, including Fast Track and Breakthrough Therapy programs, may also be eligible for other types of FDA programs intended to expedite development and review, such as priority review and accelerated approval. Any product is eligible for priority review if it has the potential to provide safe and effective therapy where no satisfactory alternative therapy exists or a significant improvement in the treatment, diagnosis or prevention of a disease compared to marketed products. The FDA will attempt to direct additional resources to the evaluation of an application for a new drug or biological product designated for priority review in an effort to facilitate the review. Additionally, a product may be eligible for accelerated approval. Drug or biological products studied for their safety and effectiveness in treating serious or life-threatening illnesses and that provide meaningful therapeutic benefit over existing treatments may receive accelerated approval, which means that they may be approved on the basis of adequate and well-controlled clinical trials establishing that the product has an effect on a surrogate endpoint that is reasonably likely to predict a clinical benefit, or on the basis of an effect on a clinical endpoint other than survival or irreversible morbidity. As a condition of approval, the FDA may require that a sponsor of a drug or biological product receiving accelerated approval perform adequate and well-controlled post-marketing clinical trials to establish safety and efficacy for the approved indication. In addition, the FDA currently requires as a condition for accelerated approval pre-review of promotional materials, which could adversely impact the timing of the commercial launch of the product. Fast Track, Breakthrough, and Priority Review designations and accelerated approval do not change the standards for approval but may expedite the development or approval process.

Emergency Use Authorization

The Emergency Use Authorization (EUA) authority allows FDA to facilitate availability and unapproved uses of medical countermeasures (MCMs) needed to prepare for and respond to chemical, biological, radiological, and nuclear (CBRN) emergencies. The EUA authority is separate from use of a drug under an investigational application (IND). As a first step, the Secretary of HHS makes the declaration of emergency or threat justifying authorization of emergency use. Then the FDA Commissioner authorizes the emergency use of an unapproved medical product or an unapproved use of an approved medical product for certain emergency circumstances. This allows an MCM to be used in an emergency to diagnose, treat, or prevent serious or life-threatening diseases or conditions caused by a CBRN agent when there are no adequate, approved, and available alternatives. A formal request to issue an EUA is generally submitted by government sponsors (e.g., HHS or the Department of Defense (DoD)) but not until the Secretary of HHS has issued the declaration. An EUA request includes a summary of the available scientific evidence regarding the product's safety and effectiveness, risks (including an adverse event profile) and benefits, and any available, approved alternatives to the product. Also included are manufacturing information and Fact sheets which are comparable to an FDA-approved package insert.

Animal Efficacy Rule

FDA permits the approval of certain drugs and biologics that are intended to reduce or prevent serious or life-threatening conditions based on evidence of safety from clinical trial(s) in healthy subjects and effectiveness from appropriate animal studies when human efficacy studies are not ethical or feasible. These regulations, which are known as the "Animal Rule", authorize the FDA to rely on animal studies to provide evidence of a product's effectiveness under circumstances where there is a reasonably well-understood mechanism for the activity of the agent. Under these requirements, and with the FDA's prior agreement, drugs used to reduce or prevent the toxicity of chemical, biological, radiological or nuclear substances may be approved for use in humans based on evidence of effectiveness derived from appropriate animal studies and any additional supporting data. Products evaluated under this rule must demonstrate effectiveness through pivotal animal studies, which are generally equivalent in design and robustness to Phase 3 clinical studies. The animal study endpoint must be clearly related to the desired benefit in humans and the information obtained from animal studies must allow for selection of an effective dose in humans. Safety under this rule is established under preexisting requirements, including safety studies in both animals (toxicology) and humans. Products approved under the Animal Rule are subject to additional requirements including post-marketing study requirements, restrictions imposed on marketing or distribution or requirements to provide information to patients.

Post-Approval Requirements

Any drug products for which we or our strategic alliance partners receive FDA approvals are subject to continuing regulation by the FDA, including, among other things, record-keeping requirements, reporting of adverse experiences with the product, providing the FDA with updated safety and efficacy information, product sampling and distribution requirements, complying with certain electronic records and signature requirements and complying with FDA promotion and advertising requirements. These promotion and advertising agreements include, among others, standards for direct-to-consumer advertising, promoting drugs for uses or in patient populations that are not described in the drug's approved labeling (known as "off-label use"), industry-sponsored scientific and educational activities, and promotional activities involving the internet. Failure to comply with FDA requirements can have negative consequences, including adverse publicity, enforcement letters from the FDA, mandated corrective advertising or communications with doctors, and civil or criminal penalties. Although physicians may prescribe legally available drugs for off-label uses, manufacturers may not market or promote such off-label uses.

We will rely, and expect to continue to rely, on third parties for the production of clinical and commercial quantities of any products that we may commercialize. Our strategic alliance partners may also utilize third parties for some or all of a product we are developing with such strategic alliance partner. Manufacturers of our products are required to comply with applicable FDA manufacturing requirements contained in the FDA's cGMP regulations. cGMP regulations require among other things, quality control and quality assurance as well as the corresponding maintenance of records and documentation. Drug manufacturers and other entities involved in the manufacture and distribution of approved drugs are required to register their establishments with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMP and other laws. Accordingly, manufacturers must continue to expend time, money, and effort in the area of production and quality control to maintain cGMP compliance. Discovery of problems with a product after approval may result in restrictions on a product, manufacturer, or holder of an approved NDA, including withdrawal of the product from the market. In addition, changes to the manufacturing process generally require prior FDA approval before being implemented and other types of changes to the approved product, such as adding new indications and additional labeling claims, are also subject to further FDA review and approval.

The FDA also may require post-marketing testing, known as Phase 4 testing, risk minimization action plans and surveillance to monitor the effects of an approved product or place conditions on an approval that could restrict the distribution or use of the product.

U.S. Patent Term Restoration and Marketing Exclusivity

Depending upon the timing, duration and specifics of the FDA approval of the use of our drug candidates, some of our United States patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, commonly referred to as the Hatch-Waxman Amendments. The Hatch-Waxman Amendments permit a patent restoration term of up to five years as compensation for patent term lost during product development and the FDA regulatory review process. However, patent term restoration cannot extend the remaining term of a patent beyond a total of 14 years from the product's approval date. The patent term restoration period is generally one-half the time between the effective date of an IND and the submission date of an NDA, plus the time between the submission date of an NDA and the approval of that application. Only one patent applicable to an approved drug is eligible for the extension and the application for the extension must be submitted prior to the expiration of the patent. The United States Patent and Trademark Office, in consultation with the

FDA, reviews and approves the application for any patent term extension or restoration. In the future, we may apply for restoration of patent term for one of our currently owned or licensed patents to add patent life beyond its current expiration date, depending on the expected length of the clinical trials and other factors involved in the filing of the relevant NDA.

Market exclusivity provisions under the FDCA can also delay the submission or the approval of certain applications of other companies seeking to reference another company's NDA. The FDCA provides a five-year period of non-patent marketing exclusivity within the United States to the first applicant to obtain approval of an NDA for a new chemical entity. A drug is a new chemical entity if the FDA has not previously approved any other new drug containing the same active moiety, which is the molecule or ion responsible for the action of the drug substance. During the exclusivity period, the FDA may not accept for review an abbreviated new drug application (ANDA), or a 505(b)(2) NDA submitted by another company for another version of such drug where the applicant does not own or have a legal right of reference to all the data required for approval. However, an application may be submitted after four years if it contains a certification of patent invalidity or non-infringement to one of the patents listed with the FDA by the innovator NDA holder. The FDCA also provides three years of marketing exclusivity for an NDA, or supplement to an existing NDA if new clinical investigations, other than bioavailability studies, that were conducted or sponsored by the applicant are deemed by the FDA to be essential to the approval of the application, for example new indications, dosages or strengths of an existing drug. This three-year exclusivity covers only the conditions associated with the new clinical investigations and does not prohibit the FDA from approving ANDAs for drugs containing the original active agent. Five-year and three-year exclusivity will not delay the submission or approval of a full NDA. However, an applicant submitting a full NDA would be required to conduct or obtain a right of reference to all of the preclinical studies and adequate and well-controlled clinical trials necessary to demonstrate safety and effectiveness. Pediatric exclusivity is another type of regulatory market exclusivity in the United States. Pediatric exclusivity, if granted, adds six months to existing exclusivity periods and patent terms. This six-month exclusivity, which runs from the end of other exclusivity protection or patent term, may be granted based on the voluntary completion of a pediatric trial in accordance with an FDA-issued "Written Request" for such a trial.

US Health Care Laws

Our operations may be subject to federal and state health care laws and regulations including, without limitation: anti-kickback statutes, false claims statutes, patient data privacy and security laws, and health care professional payment transparency laws and regulations, many of which may become more applicable if our product candidates are approved and we begin commercialization. If our operations are found to be in violation of any of these laws or regulations, we may be subject to penalties, including significant administrative, civil and criminal penalties, damages, fines, disgorgement, imprisonment, exclusion from participation in federal healthcare programs, and additional reporting obligations and oversight if we become subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws, as well as contractual damages, reputational harm, diminished profits and future earnings, and the curtailment or restructuring of our operations.

Reimbursement / Health Reform

Sales of pharmaceutical products depend in significant part on the availability of third-party reimbursement. Third-party payers include government health programs such as Medicare and Medicaid, managed care providers, private health insurers and other organizations. These third-party payers are increasingly challenging the price and examining the cost-effectiveness of medical products and services, including prescription drugs. In addition, significant uncertainty exists as to the reimbursement status of newly approved prescription drugs and other healthcare products. We may need to conduct expensive pharmacoeconomic studies in order to demonstrate the cost-effectiveness of any of our products that is successfully developed and approved. Our product candidates may not be considered cost-effective. It is time consuming and expensive to seek reimbursement from third-party payers. Reimbursement may not be available or sufficient to allow the sale of any of our products that is successfully developed and approved on a competitive and profitable basis.

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA), established the Medicare Part D program to provide a voluntary prescription drug benefit to Medicare beneficiaries. Under Part D, Medicare beneficiaries may enroll in prescription drug plans offered by private entities to provide coverage of outpatient prescription drugs. Part D plans include both stand-alone prescription drug benefit plans and prescription drug coverage as a supplement to Medicare Advantage plans. Unlike Medicare Parts A and B, Part D coverage is not standardized. Part D prescription drug plan sponsors are not required to pay for all covered Part D drugs, and each Part D prescription drug plan can develop its own drug formulary that identifies which drugs it will cover and at what tier or level. However, Part D prescription drug formularies must include drugs within each therapeutic category and class of covered Part D drugs, although not necessarily all of the drugs within each category or class. Any formulary used by a Part D prescription drug plan must be developed and reviewed by a pharmacy and therapeutic committee.

Government payment for some of the costs of prescription drugs may increase demand for any of our products that is successfully developed and approved. However, any negotiated prices for our products covered by a Part D prescription drug plan will likely be lower than the prices we might otherwise obtain. Moreover, although the MMA applies only to drug benefits for Medicare beneficiaries, private payers often follow Medicare coverage policy and payment limitations in setting their own payment rates. Accordingly, any reduction in payment that results from the MMA may result in a similar reduction in payments from non-governmental payers.

We expect that there will continue to be a number of federal and state proposals to implement governmental pricing controls and limit the growth of healthcare costs, including the cost of prescription drugs. Currently, Medicare is prohibited from negotiating directly with pharmaceutical companies for drugs. However, the U.S. Congress may in the future consider legislation that would lift the ban on federal negotiations.

The American Recovery and Reinvestment Act of 2009 provides funding for the federal government to compare the effectiveness of different treatments for the same illness. A plan for the research would be developed by the U.S. Department of Health and Human Services (DHHS), Agency for Healthcare Research and Quality and the National Institutes of Health, and periodic reports on the status of the research and related expenditures would be made to the U.S. Congress. Although the results of the comparative effectiveness studies are not intended to mandate coverage policies for public or private payers, it is not clear whether research would have any effect on the sales of any of our products that are successfully developed and approved, if the product or the condition that it is intended to treat becomes the subject of a study. It is also possible that comparative effectiveness research demonstrating benefits of a competitor's product could adversely affect the sales of any of our products that is successfully developed and approved. If third-party payers do not consider our products to be cost-effective compared to other available therapies, they may not cover our products after approval as a benefit under their plans or, if they do, the level of payment may not be sufficient to allow us to sell our products on a profitable basis.

The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010 (collectively, ACA), has had a significant impact on the health care industry. The ACA was enacted in an effort to expand coverage for the uninsured while at the same time containing overall healthcare costs. Among other things, the ACA expanded and increased industry rebates for drugs covered under Medicaid programs and made changes to the coverage requirements under the Medicare Part D program. However, there have been executive, judicial and Congressional challenges to certain aspects of the ACA. For example, President Trump signed several Executive Orders and other directives designed to delay the implementation of certain provisions of the ACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. Concurrently, Congress considered legislation to repeal or repeal and replace all or part of the ACA. While Congress has not passed comprehensive repeal legislation, several bills affecting the implementation of certain taxes under the ACA have been enacted. Legislation enacted in 2017 (H.R. 1, "An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018"), informally titled the Tax Cuts and Jobs Act of 2017 (Tax Act) includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate." In addition, the 2020 federal spending package permanently eliminated, effective January 1, 2020, the ACA-mandated "Cadillac" tax on high-cost employer-sponsored health coverage and medical device tax and, effective January 1, 2021, also eliminated the health insurer tax. The Bipartisan Budget Act of 2018, or the BBA, among other things, amended the ACA, effective January 1, 2019, to close the coverage gap in most Medicare drug plans, and also increases in 2019 the percentage that a drug manufacturer must discount the cost of prescription drugs from 50 percent to 70 percent. On December 14, 2018, a Texas U.S. District Court Judge ruled that ACA is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. Additionally, on December 18, 2019, the U.S. Court of Appeals for the 5th Circuit upheld the District Court ruling that the individual mandate was unconstitutional and remanded the case back to the District Court to determine whether the remaining provisions of the ACA are invalid as well. The U.S. Supreme Court is currently reviewing this case, The U.S. Supreme Court is currently reviewing this case, but it is unknown when a decision will be reached. Although the U.S. Supreme Court has yet ruled on the constitutionality of the ACA, on January 28, 2021, President Biden issued an executive order to initiate a special enrollment period from February 15, 2021 through May 15, 2021 for purposes of obtaining health insurance coverage through the ACA marketplace. The executive order also instructs certain governmental agencies to review and reconsider their existing policies and rules that limit access to healthcare, including among others, reexamining Medicaid demonstration projects and waiver programs that include work requirements, and policies that create unnecessary barriers to obtaining access to health insurance coverage through Medicaid or the ACA. It is unclear how the Supreme Court ruling, other such litigation, and the healthcare reform measures of the Biden administration will impact ACA.

If not preempted by the ACA, several states and local jurisdictions require pharmaceutical manufacturers to report expenses relating to the marketing and promotion of pharmaceutical products and to report gifts and payments to individual physicians in the states. Other states prohibit providing various other marketing related activities. Still other states require the posting of

information relating to clinical studies and their outcomes. In addition, some states, such as California, Nevada and Massachusetts, require pharmaceutical manufacturers to implement compliance programs or marketing codes. In addition, certain states and local jurisdictions require registration of pharmaceutical sales representatives. Currently, several additional states are considering similar proposals. Compliance with these laws is difficult and time consuming, and companies that do not comply with these state laws face civil penalties.

There has also been increasing legislative and enforcement interest in the United States with respect to drug pricing practices, including several recent Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, increase drug pricing transparency, reduce the cost of drugs under Medicare, review relationships between pricing and manufacturer patient assistance programs, and reform government program drug reimbursement methodologies. At the federal level, the Trump administration used several means to propose or implement drug pricing reform, including through federal budget proposals, executive orders and policy initiatives. For example, on July 24, 2020 and September 13, 2020, the Trump administration announced several executive orders related to prescription drug pricing that attempt to implement several of the administration's proposals. The FDA also released a final rule, effective November 30, 2020, implementing a portion of the importation executive order providing guidance for states to build and submit importation plans for drugs from Canada. Further, on November 20, 2020, HHS finalized a regulation removing safe harbor protection for price reductions from pharmaceutical manufacturers to plan sponsors under Part D, either directly or through pharmacy benefit managers, unless the price reduction is required by law. The implementation of the rule has been delayed by the Biden administration from January 1, 2022 to January 1, 2023 in response to ongoing litigation. The rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a new safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers, the implementation of which have also been delayed pending review by the Biden administration until March 22, 2021. On November 20, 2020, CMS issued an interim final rule implementing President Trump's Most Favored Nation executive order, which would tie Medicare Part B payments for certain physician-administered drugs to the lowest price paid in other economically advanced countries, effective January 1, 2021. On December 28, 2020, the United States District Court in Northern California issued a nationwide preliminary injunction against implementation of the interim final rule. However, it is unclear whether the Biden administration will work to reverse these measures or pursue similar policy initiatives. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. Such reform efforts are likely to continue the pressure on pharmaceutical pricing, especially under the Medicare program, and may also increase our regulatory burdens and operating costs.

In some foreign countries, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing vary widely from country to country. For example, the EU provides options for its member states to restrict the range of medicinal products for which their respective national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any of our products for which we receive marketing approval. Historically, the price structures for products launched in the EU do not follow those of the United States and tend to be significantly lower.

Europe / Rest of World Government Regulation

In addition to regulations in the United States, we and our strategic alliance partners will be subject to a variety of regulations in other jurisdictions governing, among other things, clinical trials and any commercial sales and distribution of our products.

Whether or not we or our collaborators obtain FDA approval for a product, we must obtain the requisite approvals from regulatory authorities in foreign countries prior to the commencement of clinical trials or marketing of the product in those countries. Certain countries outside of the United States have a similar process that requires the submission of a clinical trial application prior to the commencement of human clinical trials. In the EU, for example, a clinical trial application (CTA), must be submitted to each country's national health authority and an independent ethics committee, much like the FDA and IRB, respectively. Once the CTA is approved in accordance with a country's requirements, the particular clinical trial may proceed. Under the new Regulation on Clinical Trials, which is expected to take effect in 2020, there will be a centralized application procedure where one national authority takes the lead in reviewing the application and the other national authorities have only a limited involvement. Any substantial changes to the trial protocol or other information submitted with the clinical trial applications must be notified to or approved by the relevant competent authorities and ethics committees.

The requirements and process governing the conduct of clinical trials, product licensing, pricing and reimbursement vary from country to country. In all cases, the clinical trials are conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

To obtain regulatory approval of an investigational drug or biological product under EU regulatory systems, we or our strategic alliance partners must submit a marketing authorization application. The application used to file the NDA or a Biologics License Application in the United States is similar to the application dossier (eCTD) required in the EU.

For other countries outside of the EU, such as countries in Eastern Europe, Latin America or Asia, the requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary from country to country. In all cases, again, the clinical trials are conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

If we or our strategic alliance partners fail to comply with applicable foreign regulatory requirements, we may be subject to, among other things, fines, suspension or withdrawal of regulatory approvals, product recalls, seizure of products, operating restrictions and criminal prosecution.

EU Review and Approval Process

In the EU, there are two main routes for authorizing the marketing of medicines, a centralized route and a national route. The centralized procedure is compulsory for certain types of medicinal products which are produced by biotechnology processes, advanced therapy medicinal products and for those which are designated as orphan medicinal products. Besides the products falling under the mandatory scope, the centralized procedure is also optional for medicinal products that constitute a significant therapeutic, scientific or technical innovation i.e. new active substances or other medicinal products that constitute a significant therapeutic, scientific or technical innovation, that contain an active substance not authorized in the European Union before May 20, 2004 or for which a centralized procedure would be in the interest of patients.

Under the centralized authorization procedure, pharmaceutical companies submit a single marketing-authorization application to the EMA. EMA's Committee for Medicinal Products for Human Use (CHMP) carries out a scientific assessment of the application and makes a recommendation to the European Commission whether the medicine should be marketed or not. If authorization is granted by the European Commission, the centralized marketing authorization is valid in all EU Member States as well as in the European Economic Area (EEA) countries Iceland, Liechtenstein and Norway.

Additionally, medicines that belong to at least one of the below categories may be granted a conditional market authorization (CMA).

A CMA may be granted if: (1) the CHMP finds that the benefit-risk balance of the product is positive, (2) it is likely that the applicant will be able to provide comprehensive data, (3) the unmet medical needs will be fulfilled, and (4) the benefit to public health of the medicinal product's immediate availability on the market outweighs the risks due to need for further data.

CMAs are valid for one year and can be renewed annually. The CMA holder will be required to complete specific obligations (to complete ongoing or new studies, and in some cases additional activities) with a view to providing comprehensive data confirming that the benefit-risk balance is positive. Once comprehensive data on the product have been obtained, the CMA may be converted into a full marketing authorization (not subject to specific obligations). Initially, this is valid for five years, but can be renewed for unlimited validity.

Orphan Designation in the EU

In order to qualify for Orphan Designation, a medicine must meet the following criteria:

- it must be intended for the treatment, prevention or diagnosis of a disease that is life-threatening or chronically debilitating;
- the prevalence of the condition in the EU must not be more than 5 in 10,000 or it must be unlikely that marketing of the medicine would generate sufficient returns to justify the investment needed for its development; and
- no satisfactory method of diagnosis, prevention or treatment of the condition concerned can be authorized, or, if such a method exists, the medicine must be of significant benefit to those affected by the condition.

EMA is responsible for reviewing applications from sponsors for orphan designation. The EMA's Committee for Orphan Medicinal Products (COMP), through its network of experts, examines applications for Orphan Designation and issues an

opinion to EMA. The evaluation process takes approximately of 90 days from validation. Once EMA receives COMP's opinion, EMA sends it to the European Commission, which is responsible for granting the Orphan Designation.

At the time a sponsor of a marketing application files for marketing authorization for a medicine that has received Orphan Designation, the sponsor must also submit a report on the maintenance of the Orphan Designation in parallel. EMA uses this report to determine whether the medicine can maintain its status as an orphan medicine and benefit from the extended market exclusivity applicable to orphan products. Market exclusivity is linked to the maintenance of the Orphan Designation when the medicine receives a marketing authorization for the indication concerned.

If it is determined that a medicine still meets the criteria for Orphan Designation at the time of marketing approval, that medicine may benefit from a period of ten years market exclusivity in the EU. This incentive is intended to protect orphan medicines from market competition with similar medicines with similar indications once they are approved, and fundamentally to encourage the development of medicines for rare diseases.

The applicant is obliged to submit an annual report to the EMA every year after their medicine has been granted orphan designation. The annual report needs provide information on the status of the development of the medicine, such as a review of ongoing clinical studies, a description of the investigation plan for the coming year and any anticipated or current problems in the process, difficulties in testing and potential changes that may have an impact on the medicine's orphan designation.

The European Commission is responsible for granting market exclusivity for orphan medicines. Market exclusivity is linked to each specific Orphan Designation for which a marketing authorization has been granted.

The period of market exclusivity is extended by two years for medicines that also have complied with an agreed pediatric investigation plan (PIP). Each orphan designation for a product linked to a separate orphan condition is eligible for a two-year extension if this is accounted for in the PIP. The extension is granted by the European Commission based on the positive compliance check from the Pediatric Committee and opinion from the CHMP.

Brexit and the Regulatory Framework in the United Kingdom

On June 23, 2016, the electorate in the United Kingdom, or UK, voted in favor of leaving the EU, commonly referred to as "Brexit" and the United Kingdom officially withdrew from the EU on January 31, 2020. The United Kingdom and the EU are currently in a transition period during which the United Kingdom and the EU are negotiating additional arrangements, including their future trading arrangement. The United Kingdom has stated that it wants the transition period to expire, and the future trading terms to be agreed, by December 31, 2020.

Since the regulatory framework for pharmaceutical products in the United Kingdom covering quality, safety and efficacy of pharmaceutical products, clinical trials, marketing authorization, commercial sales and distribution of pharmaceutical products is derived from EU directives and regulations, immediately following Brexit, it is expected that the United Kingdom's regulatory regime will remain aligned with EU regulations. It remains to be seen how, if at all, Brexit will impact regulatory requirements for product candidates and products in the United Kingdom. In the longer term, Brexit could materially impact the future regulatory regime which applies to products and the approval of product candidates in the United Kingdom.

Environmental, Health and Safety Regulations

We are subject to various environmental, health and safety regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous substances. From time to time, and in the future, our operations may involve the use of hazardous materials.

Employees and Human Capital Resources

As of December 31, 2020, we had 54 full-time employees. Of these employees, 39 employees are engaged in research and development activities and 15 employees are engaged in finance, legal, human resources, facilities and general management. We have no collective bargaining agreements with our employees and we have not experienced any work stoppages. We consider our relations with our employees to be good.

We expect to continue to add additional employees in 2021 with a focus on expanding our expertise and bandwidth in clinical and preclinical research and development. We continually evaluate our business needs and opportunities and balance in house expertise and capacity with external expertise and capacity. Currently, we rely on third-party contract manufacturers.

Our Culture. The success of our human capital management investments is evidenced by our low employee turnover, a number which is regularly reviewed by our Board of Directors as part of their oversight of our human capital strategy.

Employee Engagement, Talent Development & Benefits. We believe that our future success largely depends upon our continued ability to attract and retain highly skilled employees. We provide our employees with competitive salaries and bonuses, opportunities for equity ownership, development programs that enable continued learning and growth and a robust employment package that promotes well-being across all aspects of their lives, including health care, retirement planning and paid time off. As part of our promotion and retention efforts, we also invest in ongoing leadership development through programs as well as offer tuition reimbursement.

Diversity & Inclusion. Much of our success is rooted in the diversity of our teams and our commitment to inclusion. We value diversity at all levels and continue to focus on extending our diversity and inclusion initiatives across our entire workforce. We believe that our business benefits from the different perspectives a diverse workforce brings, and we pride ourselves on having a strong, inclusive and positive culture based on our shared mission and values

Corporate Information

We were incorporated in the State of Delaware in April 2000. Our corporate headquarters are located at 2505 Meridian Parkway, Suite 100, Durham, North Carolina 27713 in a facility we lease encompassing approximately 24,862 square feet of office space. The leases for this facility expire in July 2026. We separately lease laboratory space in Durham, North Carolina, encompassing a total of approximately 7,925 square feet. The lease for this laboratory space in Durham expires in July 2026. Through our subsidiary, Oncoceutics, Inc., we lease month to month approximately 489 square feet of combined office space in New York, New York and Philadelphia, Pennsylvania.

Our corporate website address is www.chimerix.com. Our filings with the Securities and Exchange Commission are available free of charge through our website as soon as reasonably practicable after being electronically filed with or furnished to the SEC. The information contained on, or that can be accessed through, our website is not part of this Annual Report, and the inclusion of our website address in this Annual Report is an inactive textual reference only.

ITEM 1A. RISK FACTORS

Except for the historical information contained herein or incorporated by reference, this Annual Report and the information incorporated by reference contains forward-looking statements that involve risks and uncertainties. These statements include projections about our research, development and commercialization efforts, our accounting and finances, plans and objectives for the future, future operating and economic performance and other statements regarding future performance. These statements are not guarantees of future performance or events. Our actual results may differ materially from those discussed here. Factors that could cause or contribute to differences in our actual results include those discussed in the following section, as well as those discussed in Part II, Item 7 entitled "Management's Discussion and Analysis of Financial Condition and Results of Operations" and elsewhere throughout this Annual Report and in any other documents incorporated by reference into this Annual Report. You should consider carefully the following risk factors, together with all of the other information included or incorporated in this Annual Report. Each of these risk factors, either alone or taken together, could adversely affect our business, operating results and financial condition, as well as adversely affect the value of an investment in our common stock. There may be additional risks that we do not presently know of or that we currently believe are immaterial which could also impair our business and financial position.

An investment in shares of our common stock involves a high degree of risk. You should carefully consider the following information about these risks, together with the other information appearing elsewhere in this Annual Report, before deciding to invest in our common stock. The occurrence of any of the following risks could have a material adverse effect on our business, financial condition, results of operations and future growth prospects. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment.

Risks Related to Our Financial Condition and Need For Additional Capital

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

We are a biopharmaceutical company focused primarily on developing brincidofovir (BCV) for the treatment of smallpox, ONC201 for the treatment of recurrent H3 K27M-mutant glioma and dociparstat (DSTAT) for the treatment of acute myeloid leukemia (AML) and the treatment of acute lung injury (ALI) in COVID-19 patients. We have incurred significant net losses in each year since our inception, including net losses of $43.5 million, $112.6 million and $69.5 million for the twelve months ended December 31, 2020, 2019 and 2018, respectively. As of December 31, 2020, we had an accumulated deficit of approximately $712.4 million.

To date, we have financed our operations primarily through the sale of equity securities and, to a lesser extent, through government funding, licensing fees and debt. We have devoted most of our financial resources to research and development, including our preclinical development activities and clinical trials. We have not completed development of any product candidates. We may continue to incur losses and negative cash flows for the foreseeable future. The size of any loss will depend, in part, on the rate of future expenditures and our ability to generate revenues. In particular, we expect to incur substantial expenses as we seek to:

- continue development and manufacturing activities of imipridones, including ONC201 for the treatment of recurrent H3 K27M-mutant glioma, and other potential indications;
- continue development and manufacturing activities of DSTAT for the treatment of AML, the treatment of ALI in COVID-19 patients, and other potential indications;
- continue the development of BCV for the treatment of smallpox as a medical countermeasure;
- obtain regulatory approvals for BCV, ONC201 and DSTAT;
- scale-up manufacturing capabilities to commercialize BCV and DSTAT in the event we receive regulatory approval;
- identify and in-license additional product candidates to expand our research and development pipeline;
- maintain, expand and protect our intellectual property portfolio; and
- continue our internal research and development efforts and seek to discover additional product candidates.

To become and remain profitable, we must succeed in developing and eventually commercializing products with significant market potential. This will require us to be successful in a range of challenging activities, including acquiring or discovering product candidates, completing preclinical testing and clinical trials of our product candidates, obtaining regulatory approval for these product candidates, and manufacturing, marketing and selling those products for which we may obtain regulatory approval. We are only in the preliminary stages of some of these activities.

To date, we have not obtained regulatory approval for any product candidate, and none of our product candidates have been commercialized. We may never succeed in developing or commercializing any product candidate. If we do not successfully develop or commercialize any product candidate, or if revenues from any products that do receive regulatory approvals are insufficient, we will not achieve profitability and our business may fail. Even if we successfully obtain regulatory approval to market a product candidate in the United States, our revenues are also dependent upon the size of markets outside of the United States, as well as our ability to obtain market approval and achieve commercial success outside of the United States.

Even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis. Our failure to become and remain profitable would depress the value of our company and could impair our ability to raise capital, expand our business, diversify our product offerings or continue our operations. A decline in the value of our company could cause you to lose all or part of your investment.

Our ability to generate future revenues from product sales is uncertain and depends upon our ability to successfully develop, obtain regulatory approval for, and commercialize product candidates.

Our ability to generate revenue and achieve profitability depends on our ability, alone or with collaborators, to successfully complete the development, obtain the necessary regulatory approvals and commercialize product candidates. We may not generate revenues from product sales for the foreseeable future. Our ability to generate future revenues from product sales depends heavily on our success in:

- obtaining favorable results for and advancing development of imipridones, including ONC201 for the treatment of recurrent H3 K27M-mutant glioma, and other potential indications;
- obtaining favorable results for and advancing the development of DSTAT for the treatment of AML and ALI, and BCV for the treatment of smallpox;
- obtaining United States and foreign regulatory approval(s) for ONC201, DSTAT and BCV;
- generating, licensing or otherwise acquiring a pipeline of product candidates which progress to clinical development, regulatory approval, and commercialization.

Conducting preclinical testing and clinical trials is a time-consuming, expensive and uncertain process that takes years to complete, and we may never generate the necessary data required to obtain regulatory approval and achieve product sales. Our anticipated development costs would likely increase if we do not obtain favorable results or if development of any product candidate is delayed. In particular, we would likely incur higher costs than we currently anticipate if development of any product candidate is delayed because we are required by the FDA or foreign regulatory authorities to perform studies or trials in addition to those that we currently anticipate, or we decide to conduct additional studies or trials for strategic reasons.

Because of the numerous risks and uncertainties associated with pharmaceutical product development, we are unable to predict with certainty the timing or amount of any increase in our anticipated development costs that will result should any additional trials be necessary.

In addition, any product candidate, if approved, may not achieve commercial success. Our commercial revenues, if any, will be derived from sales of products that we may not be commercially available for a number of years, if at all. Even if any product candidate is approved for commercial sale, we anticipate incurring significant costs in connection with commercialization. As a result, we cannot assure you that we will be able to generate revenues from sales of any approved product candidate, or that we will achieve or maintain profitability even if we do generate sales.

If we fail to obtain additional financing, we could be forced to delay, reduce or eliminate our product development programs, seek corporate partners for the development of our product development programs or relinquish or license on unfavorable terms, our rights to technologies or product candidates.

Developing pharmaceutical products, including conducting preclinical studies and clinical trials, is a time-consuming, expensive and uncertain process that takes years to complete. We believe that our existing capital available to fund operations will enable us to fund our current operating expenses and capital requirements for at least the next twelve months. Changing circumstances beyond our control may cause us to consume capital more rapidly than we currently anticipate, and our clinical trials may encounter technical, enrollment or other difficulties that could increase our development costs more than we expected, or because the FDA or foreign regulatory authorities require us to perform studies or trials in addition to those that we currently anticipate.

In July 2019, we entered into a License and Development Agreement with Cantex in which we acquired an exclusive worldwide license to develop and commercialize DSTAT. We are currently enrolling a Phase 2/3 study of DSTAT in ALI for patients with COVID-19 and plan to initiate a Phase 3 trial in AML in early 2021.

In January 2021, we acquired Oncoceutics, Inc. (Oncoceutics), a privately-held, clinical-stage biotechnology company developing imipridones, a novel potential class of compounds. Oncoceutics' lead product candidate, ONC201, selectively induced cell death in multiple cancer types in clinical trials. ONC201 is currently being evaluated in multiple clinical studies including in a registrational program for recurrent H3 K27M-mutant glioma.

We are also pursuing additional external opportunities to build our pipeline of product candidates, and we may need to raise additional funds if we identify additional product candidates, which we may obtain through one or more equity offerings, debt financings, government or other third-party funding, strategic alliances and licensing or collaboration arrangements.

Securing additional financing may divert our management from our day-to-day activities, which may adversely affect our ability to develop and commercialize our most advanced clinical compounds, or any other product candidate. In addition, we cannot guarantee that future financing will be available in sufficient amounts or on terms acceptable to us, if at all. If we are unable to raise additional capital when required or on acceptable terms, we may be required to:

- significantly delay, scale back or discontinue the development or commercialization of BCV, ONC201, DSTAT, or any other product candidate;
- seek corporate partners for BCV, ONC201, DSTAT, or any other product candidate at an earlier stage than otherwise would be desirable or on terms that are less favorable than might otherwise be available; or
- relinquish or license on unfavorable terms, our rights to technologies or product candidates that we otherwise would seek to develop or commercialize ourselves.

If we are unable to raise additional capital in sufficient amounts or on terms acceptable to us, we will be prevented from pursuing development and commercialization efforts, which will have a material adverse effect on our business, operating results and prospects and on our ability to develop our product candidates.

We are evaluating external assets to build our pipeline of product candidates and there can be no assurance that we will be successful in identifying or completing a transaction for a candidate, that any such transaction will result in additional value for our stockholders or that the process will not have an adverse impact on our business.

In early 2019, we initiated a review of external assets that could be added to our pipeline of product candidates. In July 2019, in connection with this process, we entered into a License and Development Agreement with Cantex Pharmaceuticals, Inc. (Cantex) pursuant to which we acquired exclusive worldwide rights to develop and commercialize DSTAT for any and all uses. In January 2021, we acquired Oncoceutics, a privately-held, clinical-stage biotechnology company developing imipridones, including ONC201. In connection with these transactions, we are responsible for, and bear the future costs of, development and commercialization of the acquired compounds. These costs will be substantial, and we may require additional capital in order to pursue the development and commercialization of these compounds as planned. Moreover, the anticipated benefits of these transactions may never be realized due to the various risks and uncertainties associated with drug development detailed elsewhere in the following risk factors.

In addition to DSTAT and ONC201, we may in-license or acquire additional assets, engage in a merger or acquisition transaction, issue additional shares of our common stock, or engage in other potential actions designed to maximize stockholder value. Our continuing review of external assets may not result in the identification or consummation of any transaction. The process of reviewing external opportunities may be time consuming and disruptive to our business operations and, if we are unable to effectively manage the process, our business, financial condition and results of operations could be adversely affected. We could incur substantial expenses associated with identifying, evaluating, negotiating, and consummating potential transactions. There can be no assurance that any potential additional transaction, if consummated, will provide greater value to our stockholders than that reflected in the current price of our common stock. In addition, once any potential additional transaction is consummated, we are likely to incur substantial costs associated with future development and testing of any new product candidate, which may require us to raise additional capital.

Risks Related to Clinical Development and Regulatory Approval

We face risks related to the coronavirus (COVID-19) outbreak, which could significantly disrupt our preclinical studies and clinical trials.

The duration and the geographic impact of the business disruption and related financial impact resulting from the coronavirus cannot be reasonably estimated at this time and our business could be adversely impacted by the effects. We are currently conducting clinical trials of our product candidates in the United States. We rely on independent clinical investigators, contract research organizations and other third-party service providers to assist us in managing, monitoring and otherwise carrying out

our non-clinical studies and clinical trials, and the outbreak may affect their ability to devote sufficient time and resources to our programs. Similarly, clinical site initiation and patient enrollment may be delayed due to concerns for patient safety and prioritization of healthcare resources toward the COVID-19 pandemic. We also rely on third party suppliers and contract manufacturers to produce the drug product we utilize in our clinical trials, and the outbreak may cause delays in delivery and increases in the cost of active pharmaceutical ingredients (APIs) and drug product. As a result, the expected timeline for data readouts of our non-clinical studies and clinical trials and certain regulatory filings may be negatively impacted, and our APIs and drug product may become more expensive to obtain. The COVID-19 pandemic is also causing disruption of global financial markets which, if sustained or recurrent, could make it more difficult for us to access capital. The ultimate impact of the COVID-19 pandemic is highly uncertain and subject to change, and may adversely affect our business, healthcare systems and the global economy as a whole.

Our product candidates are still under clinical development and may not obtain regulatory approval or be successfully commercialized.

We have not marketed, distributed or sold any products. Our product candidates are ONC201, which we are developing for the treatment of recurrent H3 K27M-mutant glioma, DSTAT, which we are developing for the treatment of AML, the treatment of ALI in COVID-19 patients, and other potential indications and BCV, which we continue to develop for the treatment of smallpox as a medical countermeasure. We are in late stage clinical development for both ONC201 and DSTAT. The new drug application (NDA) for BCV as a medical countermeasure for the treatment of smallpox is currently under FDA review and has a PDUFA date of April 7, 2021.

There is no guarantee that our current or future clinical trials will be approved by regulators, and no guarantee that they will be completed or, if completed, will be successful, or if successful, will result in an approval for the sale of any of our product candidates. The success of each of DSTAT and BCV will depend on several factors, including the following:

- generating positive safety and efficacy data from our clinical trials of DSTAT and ONC201;
- acceptance of data from our studies of oral BCV in animal models, including analyses necessary to bridge to a recommended human dose, by the FDA and foreign regulatory bodies;
- receipt of marketing approvals from the FDA and corresponding regulatory authorities outside the United States;
- establishing manufacturing capabilities necessary for a registration trial and commercialization of DSTAT;
- establishing commercial manufacturing capabilities for BCV;
- acceptance of the product, if approved for marketing;
- effectively competing with other therapies;
- a continued acceptable safety profile of the product following approval; and
- obtaining, maintaining, enforcing and defending intellectual property rights and claims.

If we do not achieve one or more of these factors in a timely manner or at all, we could experience significant delays or an inability to successfully commercialize BCV, ONC201, and DSTAT, which would materially harm our business.

We have never obtained regulatory approval for a drug and we may be unable to obtain, or may be delayed in obtaining, regulatory approval for most advanced clinical candidates: BCV, ONC201 and DSTAT.

We have never obtained regulatory approval for a drug. It is possible that the FDA and/or foreign health authorities, such as the EMA, may refuse to accept our NDA (or corresponding foreign application) for substantive review or may conclude after review of our data that our application is insufficient to obtain regulatory approval of any of our lead clinical candidates.

Through our continuing development contract with BARDA, we completed the second rabbitpox efficacy study as well as a pivotal efficacy study in the mouse model (ectromelia virus). We believe that efficacy data from these models could support the approval of BCV for the treatment of smallpox. The NDA for BCV is currently under review by FDA and has a PDUFA date of April 7, 2021.

In July 2019, we entered into a license agreement with Cantex where we acquired an exclusive license to global development and commercialization rights to DSTAT. We are currently enrolling a Phase 2/3 study of DSTAT in ALI for patients with COVID-19 and a Phase 3 trial in AML.

In January 2021, we acquired Oncoceutics, a privately-held, clinical-stage biotechnology company developing imipridones, a novel potential class of compounds. Oncoceutics' lead product candidate, ONC201, is currently being evaluated in multiple clinical studies including in a registrational program for recurrent H3 K27M-mutant glioma.

We have not yet reached agreement with the FDA or foreign regulators regarding the adequacy of these planned studies, for any of our most advanced clinical candidates, with respect to a potential approval for marketing. We may be required to conduct additional clinical, nonclinical or manufacturing validation studies and submit those data before reconsideration of our application occurs. Depending on the extent of these or any other required studies, approval of any NDA or application that we submit may be delayed by several years, or may require us to expend more resources than we have available. It is also possible that additional studies, if performed and completed, may not be considered sufficient by the FDA and/or foreign health authorities to approve our NDA or foreign application.

Any delay in obtaining, or an inability to obtain, regulatory approvals could prevent us from generating revenues and achieving and sustaining profitability. If any of these outcomes occur, we may be forced to abandon our development efforts for ONC201, DSTAT and BCV, which would have a material adverse effect on our business and could potentially cause us to cease operations.

We depend on the successful completion of clinical trials for our product candidates, including BCV, ONC201 and DSTAT. The positive clinical results obtained for our product candidates in prior clinical studies may not be repeated in future clinical studies.

Before obtaining regulatory approval for the sale of our product candidates, including BCV, ONC201 and DSTAT, we must conduct extensive clinical trials to demonstrate the safety and efficacy of our product candidates. 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 of our clinical trials can 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 clinical trial do not necessarily predict final results. Moreover, preclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval for their products.

We may experience a number of unforeseen events during, or as a result of, clinical trials or animal efficacy studies for our product candidates, that could adversely affect the completion of our clinical trials, including:

- 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;
- 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;
- animal efficacy studies of our product candidates may produce negative or inconclusive results, and we may decide, or regulators may require us to conduct additional animal efficacy studies or abandon development programs;
- we might be required to change one of our clinical research organizations (CROs) during ongoing clinical programs;
- the number of subjects required for clinical trials of our product candidates may be larger than we anticipate, enrollment in these clinical trials may be insufficient or slower than we anticipate, or subjects 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;
- we may have to suspend or terminate clinical trials of our product candidates for various reasons, including a finding that the subjects are being exposed to unacceptable health risks, or other factors such as the impact of the ongoing COVID-19 pandemic;
- 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;
- the cost of clinical trials of our product candidates may be greater than we anticipate;
- we may encounter agency or judicial enforcement actions which impact our clinical trials;
- 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; or
- our product candidates may have undesirable side effects or other unexpected characteristics, causing us or our investigators to suspend or terminate the trials.

We do not know whether any clinical trials we may conduct will demonstrate adequate efficacy and safety to result in regulatory approval to market our most advanced product candidates, including BCV, ONC201 and DSTAT. If later stage clinical trials do not produce favorable results, our ability to obtain regulatory approval for any of our product candidates may be adversely impacted.

Delays in clinical trials are common and have many causes, and any delay could result in increased costs to us and jeopardize or delay our ability to obtain regulatory approval and commence product sales.

Clinical testing is expensive, difficult to design and implement, can take many years to complete, and is uncertain as to outcome. We may experience delays in clinical trials at any stage of development and testing of our product candidates. Our planned clinical trials may not begin on time, have an effective design, enroll a sufficient number of subjects, or be completed on schedule, if at all.

Events which may result in a delay or unsuccessful completion of clinical trials, including our currently planned or future clinical trials for any of BCV, ONC201, or DSTAT, include:

- inability to raise funding necessary to initiate or continue a trial;
- delays in obtaining, or failure to obtain, regulatory approval of Investigational New Drug applications or to commence a trial;
- delays in reaching agreement with the FDA and foreign health authorities on final trial design;
- imposition of a clinical hold following an inspection of our clinical trial operations or trial sites by the FDA or other regulatory authorities;
- delays caused by disagreements with existing CROs and/or clinical trial sites;
- delays in reaching agreement on acceptable terms with prospective CROs and clinical trial sites;
- delays in obtaining, or failure to obtain, required IRB or ethics committee (EC) approvals covering each site;
- delays in recruiting suitable patients to participate in a trial;
- delays in having subjects complete participation in a trial or return for post-treatment follow-up;
- delays caused by subjects dropping out of a trial due to side effects or otherwise;
- clinical sites declining to participate or dropping out of a trial to the detriment of enrollment;
- agency or judicial enforcement actions against us;
- time required to add new clinical sites; and
- delays by our contract manufacturers to produce and deliver sufficient supply of clinical trial materials.

Many of the above factors may be caused or exacerbated by the impact of the ongoing COVID-19 pandemic. If initiation or completion of any of our clinical trials for our product candidates, are delayed for any of the above reasons, our development costs may increase, our approval process could be delayed, any periods during which we may have the exclusive right to commercialize our product candidates may be reduced and our competitors may have more time to bring products to market before we do. Any of these events could impair our ability to generate revenues from product sales and impair our ability to generate regulatory and commercialization milestones and royalties, all of which could have a material adverse effect on our business.

Our product candidates may cause adverse effects or have other properties that could delay or prevent their regulatory approval or limit the scope of any approved label or market acceptance.

Adverse events (AEs) caused by our product candidates could cause us, other reviewing entities, clinical study sites or regulatory authorities to interrupt, delay or halt clinical studies and could result in the denial of regulatory approval. For example, subjects enrolled in our clinical trials for BCV have experienced gastrointestinal AEs and liver-related safety laboratory value changes. In addition, BCV is related to the approved drug cidofovir, a compound which has been shown to result in significant renal toxicity and impairment following use. As a second example, subjects enrolled in clinical trials for DSTAT have experienced febrile neutropenia and liver enzyme elevations. If an unacceptable frequency and/or severity of AEs are reported in our clinical trials for our product candidates, our ability to obtain regulatory approval for product candidates may be negatively impacted.

If any of our approved products cause serious or unexpected side effects prior to or after receiving market approval, a number of potentially significant negative consequences could result, including:

- regulatory authorities may approve the product only with a risk evaluation and mitigation strategy (REMS), potentially with restrictions on distribution and other elements to assure safe use (ETASU);
- regulatory authorities may withdraw their approval of the product or impose restrictions on its distribution in a form of a modified REMS;
- regulatory authorities may require the addition of labeling statements, such as warnings or contraindications;
- we may be required to change the way the product is administered or to conduct additional clinical studies;
- we could be sued and held liable for harm caused to patients; and
- our reputation may suffer.

Any of these events could prevent us from achieving or maintaining market acceptance of the affected product candidate and could substantially increase the costs of commercializing our product candidates.

After the completion of our clinical trials, we cannot predict whether or when we will obtain regulatory approval to commercialize any of our product candidates and we cannot, therefore, predict the timing of any future revenue from BCV, ONC201 or DSTAT.

We cannot commercialize our product candidates, including BCV, ONC201 and DSTAT, until the appropriate regulatory authorities have reviewed and approved the product candidate. The regulatory agencies may not complete their review processes in a timely manner, or we may not be able to obtain regulatory approval for any of our product candidates. Additional delays in the United States may result if any of our product candidates is brought before an FDA advisory committee, which could recommend restrictions on approval or recommend non-approval of the product candidate. In the EU context, an Oral Explanation during MAA review could extend approval timelines and result in a Negative Opinion. A re-examination procedure is available in the EU whereby a Negative Opinion could be over-turned and become a Positive Opinion. New rapporteurs would be selected for the product. In addition, we may experience delays or rejections based upon additional government regulation from future legislation or administrative action, or changes in regulatory agency policy during the period of product development, clinical studies and the review process. As a result, we cannot predict when, if at all, we will receive any future revenue from commercialization of any of our product candidates.

The FDA has granted rare pediatric disease designation to ONC201 for the treatment of glioblastoma. However, a marketing application for ONC201, if approved, may not meet the eligibility criteria for a priority review voucher.

The FDA has granted rare pediatric disease designation to ONC201 for treatment of H3 K27M-mutant glioma. Designation of a drug as a drug for a rare pediatric disease does not guarantee that an NDA for such drug will meet the eligibility criteria for a rare pediatric disease priority review voucher at the time the application is approved. Under the Federal Food, Drug, and Cosmetic Act (FDCA), we will need to request a rare pediatric disease priority review voucher in our original NDA for ONC201. The FDA may determine that an NDA for ONC201, if approved, does not meet the eligibility criteria for a priority review voucher, including for the following reasons:

- treatment of H3 K27M-mutant glioma no longer meets the definition of a rare pediatric disease;
- the NDA contains an active ingredient (including any ester or salt of the active ingredient) that has been previously approved in an NDA;
- the NDA is not deemed eligible for priority review;
- the NDA does not rely on clinical data derived from studies examining a pediatric population and dosages of the drug intended for that population (that is, if the NDA does not contain sufficient clinical data to allow for adequate labeling for use by the full range of affected pediatric patients); or
- the NDA is approved for a different adult indication than the rare pediatric disease for which ONC201 is designated.

The authority for the FDA to award rare pediatric disease priority review vouchers for drugs that have received rare pediatric disease designation prior to September 30, 2024 currently expires on September 30, 2026, although it is possible the FDA's authority to award rare pediatric disease priority review vouchers will be further extended through federal lawmaking. Absent any such extension, if the NDA for ONC201 is not approved prior to September 30, 2026 for any reason, regardless of whether it meets the criteria for a rare pediatric disease priority review voucher, it will not be eligible for a priority review voucher.

Even if we obtain regulatory approval for any of our product candidates, including BCV, ONC201 and DSTAT, we will still face extensive regulatory requirements and our products may face future development and regulatory difficulties.

Even if we obtain regulatory approval, the granting authority may still impose significant restrictions on the indicated uses, distribution or marketing of our product candidates, including ONC201, DSTAT and BCV, or impose ongoing requirements for potentially costly post-approval studies or post-market surveillance. For example, the labeling ultimately approved for our product candidates, will likely include restrictions on use due to the specific patient population and manner of use in which the drug was evaluated and the safety and efficacy data obtained in those evaluations. In addition, the distribution of ONC201, DSTAT or BCV may be tightly controlled through a REMS with ETASU, which are required medical interventions or other actions healthcare professionals need to execute prior to prescribing or dispensing the drug to the patient. Some actions may also be required in order for the patient to continue on treatment. For example, the label for BCV may be required to include a boxed warning, or "black box," regarding BCV being carcinogenic, teratogenic and impairing fertility in animal studies. The BCV labeling may also include warnings pertaining to gastrointestinal AEs or liver-related safety laboratory value changes or black boxes related to the mortality disadvantage with extended dosing observed in the SUPPRESS trial.

Our product candidates will also be subject to additional ongoing regulatory requirements governing the labeling, packaging, storage, distribution, safety surveillance, advertising, promotion, record-keeping and reporting of safety and other post-market information. In the United States, the holder of an approved NDA is obligated to monitor and report AEs and any failure of a product to meet the specifications in the NDA. The holder of an approved NDA must also submit new or supplemental applications and obtain FDA approval for certain changes to the approved product, product labeling or manufacturing process. If a REMS is required, the NDA holder may be required to monitor and evaluate those in the healthcare system who are responsible for implementing ETASU measures. Advertising and promotional materials must comply with FDA rules and are subject to FDA review, in addition to other potentially applicable federal and state laws. Moreover, EU and member countries impose strict restrictions on the promotion and marketing of drug products. The off-label promotion of medicinal products is prohibited in the U.S., EU and in other territories. The promotion of medicinal products that are not subject to a marketing authorization is also prohibited in the EU. Violations of the rules governing the promotion of medicinal products in the EU and in other territories could be penalized by administrative measures, fines and imprisonment.

In addition, manufacturers of drug products and their facilities are subject to payment of user fees and continual review and periodic inspections by regulatory authorities for compliance with Current Good Manufacturing Practices (cGMP), and adherence to commitments made in the application. If we, or a regulatory agency, discover previously unknown problems with a product, such as quality issues or AEs of unanticipated severity or frequency, or problems with the facility where the product is manufactured, a regulatory agency may impose restrictions relative to that product or the manufacturing facility, including requiring recall or withdrawal of the product from the market or suspension of manufacturing.

If we fail to comply with applicable regulatory requirements following approval of any product candidates, a regulatory agency may:

- issue an untitled or warning letter asserting that we are in violation of the law;
- seek an injunction or impose civil or criminal penalties or monetary fines;
- suspend or withdraw regulatory approval;
- suspend any ongoing clinical trials;
- refuse to approve a pending application or supplements to an application submitted by us;
- recall and/or seize product; or
- refuse to allow us to enter into supply contracts, including government contracts.

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

Obtaining FDA approval for any one of our products in the United States does not mean we will ever obtain approval for or commercialize BCV, ONC201,* DSTAT, *or any other products outside of the United States, nor does approval of any of our products outside the United States mean we will ever obtain approval for or commercialize any other products inside the United States, all of which could limit our ability to realize their full market potential.

In order to market any products outside of the United States, we must establish and comply with numerous and varying regulatory requirements on a country-by-country basis regarding safety and efficacy. Approval by the FDA does not ensure approval by regulatory authorities in other countries or jurisdictions. In addition, clinical trials conducted in one country may not be accepted by regulatory authorities in other countries, and regulatory approval in one country does not guarantee regulatory approval in any other country. Approval processes vary among countries and can involve additional product testing and validation and additional administrative review periods. Seeking foreign regulatory approval could result in difficulties and costs for us and require additional preclinical studies or clinical trials which could be costly and time consuming. Regulatory requirements can vary widely from country to country and could delay or prevent the introduction of our products in those countries. We do not have any product candidates approved for sale in any jurisdiction, including international markets, and we do not have experience in obtaining regulatory approval in any markets. If we fail to comply with regulatory requirements in international markets or to obtain and maintain required approvals, or if regulatory approvals in international markets are delayed, our target market will be reduced and our ability to realize the full market potential of our products will be unrealized.

Conversely, approval by regulatory authorities outside the United States, such as the European Commission, does not ensure approval by the FDA. Moreover, clinical trials conducted outside the United States may not be accepted by the FDA.

Coverage and adequate reimbursement may not be available for our current or any future product candidates, which could make it difficult for us to sell profitably, if approved.

Market acceptance and sales of any product candidates that we commercialize, if approved, will depend in part on the extent to which coverage and adequate reimbursement will be available from third-party payers, including government health administration authorities, managed care organizations and private health insurers. Third-party payers decide which therapies they will pay for and establish reimbursement levels. Third-party payers in the United States often rely upon Medicare coverage policy and payment limitations in setting their own coverage and reimbursement policies. However, decisions regarding the extent of coverage and amount of reimbursement to be provided for any product candidates that we develop will be made on a payer-by-payer basis. One payer's determination to provide coverage for a drug does not assure that other payers will also provide coverage and adequate reimbursement for the drug. Additionally, a third-party payer's decision to provide coverage for a therapy does not imply that an adequate reimbursement rate will be approved. Third-party payers are increasingly challenging the price, examining the medical necessity and reviewing the cost-effectiveness of medical products, therapies and services, in addition to questioning their safety and efficacy. We cannot be sure that coverage and reimbursement in the United States or elsewhere will be available for any product that we may develop, and any reimbursement that may become available may be decreased or eliminated in the future.

Our relationships with investigators, health care professionals, consultants, third-party payers, and customers may 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 and others play a primary role in the recommendation and prescribing of any products for which we obtain marketing approval. Our current business operations and future arrangements with investigators, healthcare professionals, consultants, third-party payers and customers may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations. These laws may constrain the business or financial arrangements and relationships through which we research, market, sell and distribute our products for which we obtain marketing approval. Restrictions under applicable federal and state healthcare laws and regulations, include, but are not limited to, the following:

- the federal healthcare anti-kickback statute which prohibits, among other things, persons or entities from knowingly and willfully soliciting, offering, receiving or paying remuneration (including any kickback, bribe or rebate), directly or indirectly, overtly or covertly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, lease, order or recommendation of, any good, facility, item or service, for which payment may be made, in whole or in part, under federal healthcare programs such as Medicare and Medicaid;
- the federal civil and criminal false claims laws, including the Federal Civil False Claims Act (False Claims Act) which permit private individuals to bring a civil action on behalf of the federal government to enforce certain of these laws thought civil whistleblower or *qui tam* actions and the Federal Civil Monetary Penalties Act, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, to the federal government, claims for payment or approval that are false or fraudulent or from knowingly making a false statement to improperly avoid, decrease or conceal an obligation to pay money to the federal government;
- the federal Health Insurance Portability and Accountability Act of 1996 (HIPAA) which, among other things, imposes criminal liability for knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program or to obtain, by means of false or fraudulent pretenses, representations, or promises, any of the money or property owned by, or under the custody or control of, any healthcare benefit program, regardless of the payer (e.g., public or private) and knowingly or willfully falsifying, concealing or covering up by any trick or device a material fact or making any materially false statement in connection with the delivery of, or payment for, healthcare benefits, items or services relating to healthcare matters;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act (HITECH), and their implementing regulations impose certain obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information without appropriate authorization by entities subject to the rule, such as health plans, healthcare clearinghouses and certain healthcare providers, and their business associates as well as their covered subcontractors;
- the General Data Protection Regulation (GDPR), which impose obligations on companies in relation to the handling of personal data of individuals within the EU, along with related national legislation;
- mandated physician payments reporting laws and/or requirements throughout global jurisdictions, including EU member states, in which we conduct research and development and/or other business activities;
- the FDCA which prohibits, among other things, the adulteration or misbranding of drugs and devices;
- the federal transparency law, enacted as part of the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010 (collectively, the ACA), and its implementing regulations, which requires manufacturers of drugs, devices, biologicals and medical supplies to report to the Centers for Medicare & Medicaid Services (CMS) information related to payments and other transfers of value made to

physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members. Beginning in 2022, applicable manufacturers also will be required to report such information regarding its payments and other transfers of value to physician assistants, nurse practitioners, clinical nurse specialists, anesthesiologist assistants, certified registered nurse anesthetists and certified nurse midwives during the previous year; and

- analogous state laws and regulations, including: state anti-kickback and false claims laws, which may apply to our business practices, including but not limited to, research, distribution, sales and marketing arrangements and claims involving healthcare items or services reimbursed by state governmental and non-governmental third-party payers, including private insurers; state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government; state and local laws that require the registration of pharmaceutical sales representatives; state laws and regulations that require manufacturers to file reports relating to pricing and marketing information, which requires tracking gifts and other remuneration and items of value provided to healthcare professionals and entities; and state laws governing the privacy and security of health information, many of which differ from each other in significant ways and often are not preempted by HIPAA.

Efforts to ensure that our business arrangements with third parties comply with applicable healthcare laws and regulations involve substantial costs. It is possible that governmental authorities will conclude that our business practices do not comply with current or future statutes, regulations, agency guidance or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of these or any other health regulatory laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, disgorgement, imprisonment, additional reporting obligations and oversight if we become subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws, exclusion from government funded healthcare programs, such as Medicare and Medicaid, and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our financial results. Any action against us for violation of these laws, even if we successfully defend against it, could cause us to incur significant legal expenses and/or divert our management's attention from the operation of our business. If any of the physicians or other providers or entities with whom we expect to do business are found to be not in compliance with applicable laws, they also may be subject to significant criminal, civil or administrative sanctions, including, but not limited to, exclusions from government funded healthcare programs, which could also materially affect our business.

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 products for which we obtain marketing approval.

For example, in March 2010, the ACA was enacted to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for health care and health insurance industries, impose new taxes and fees on the health industry and impose additional health policy reforms. The ACA revises the definition of "average manufacturer price" for reporting purposes, which could increase the amount of Medicaid drug rebates to states. Further, the law imposes a significant annual fee on companies that manufacture or import branded prescription drug products. New provisions affecting compliance have also been enacted, which may affect our business practices with health care practitioners. However, there have been executive, judicial and Congressional challenges to certain aspects of the ACA. For example, President Trump signed Executive Orders and other directives designed to delay the implementation of certain provisions of the ACA or otherwise circumvent some of the requirements for health insurance mandated by the ACA. Concurrently, Congress considered legislation that would repeal or repeal and replace all or part of the ACA. While Congress has not passed comprehensive repeal legislation, several bills affecting the implementation of certain taxes under the ACA have been enacted. The Tax Cuts and Jobs Act of 2017 (Tax Act) repealed, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate." In addition, the 2020 federal spending package permanently eliminated, effective January 1, 2020, the ACA-mandated "Cadillac" tax on high-cost employer-sponsored health coverage and medical device tax and, effective January 1, 2021, also eliminates the health insurer tax. The Bipartisan Budget Act of 2018, or the BBA, among other things, amended the ACA, effective January 1, 2019, to close the coverage gap in most Medicare drug plans, and also increased in the percentage that a drug manufacturer must discount the cost of prescription drugs from 50 percent to 70 percent. On December 14, 2018, a Texas U.S. District Court Judge ruled that ACA is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. Additionally, on December 18, 2019, the U.S. Court of Appeals for the 5th Circuit upheld the District Court ruling that the

individual mandate was unconstitutional and remanded the case back to the District Court to determine whether the remaining provisions of the ACA are invalid as well. The U.S. Supreme Court is currently reviewing this case, but it is unknown when a decision will be reached. Although the U.S. Supreme Court has yet ruled on the constitutionality of the ACA, on January 28, 2021, President Biden issued an executive order to initiate a special enrollment period from February 15, 2021 through May 15, 2021 for purposes of obtaining health insurance coverage through the ACA marketplace. The executive order also instructs certain governmental agencies to review and reconsider their existing policies and rules that limit access to healthcare, including among others, reexamining Medicaid demonstration projects and waiver programs that include work requirements, and policies that create unnecessary barriers to obtaining access to health insurance coverage through Medicaid or the ACA. It is unclear how the Supreme Court ruling, other such litigation, and the healthcare reform measures of the Biden administration will impact ACA and our business.

Legislative and regulatory proposals have also been made to expand post-approval requirements and restrict sales and promotional activities for pharmaceutical products.

Additionally, there has been increasing legislative and enforcement interest in the United States with respect to specialty drug pricing practices. Specifically, there have been several recent U.S. Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under Medicare, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs. At the federal level, the Trump administration used several means to propose or implement drug pricing reform, including through federal budget proposals, executive orders and policy initiatives. For example, on July 24, 2020 and September 13, 2020, the Trump administration announced several executive orders related to prescription drug pricing that attempt to implement several of the administration's proposals. The FDA also released a final rule, effective November 30, 2020, implementing a portion of the importation executive order providing guidance for states to build and submit importation plans for drugs from Canada. Further, on November 20, 2020, HHS finalized a regulation removing safe harbor protection for price reductions from pharmaceutical manufacturers to plan sponsors under Part D, either directly or through pharmacy benefit managers, unless the price reduction is required by law. The implementation of the rule has been delayed by the Biden administration from January 1, 2022 to January 1, 2023 in response to ongoing litigation. The rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a new safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers, the implementation of which have also been delayed pending review by the Biden administration until March 22, 2021. On November 20, 2020, CMS issued an interim final rule implementing President Trump's Most Favored Nation executive order, which would tie Medicare Part B payments for certain physician-administered drugs to the lowest price paid in other economically advanced countries, effective January 1, 2021. On December 28, 2020, the United States District Court in Northern California issued a nationwide preliminary injunction against implementation of the interim final rule. However, it is unclear whether the Biden administration will work to reverse these measures or pursue similar policy initiatives. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. Such reform efforts are likely to continue the pressure on pharmaceutical pricing, especially under the Medicare program, and may also increase our regulatory burdens and operating costs.

Healthcare reform measures that may be adopted in the future may result in more rigorous coverage criteria, lower reimbursement, and additional downward pressure on the price that we receive for any future approved product. It is possible that additional governmental action may be taken in response to the COVID-19 pandemic. We cannot predict what healthcare reform initiatives may be adopted in the future.

Risks Related to Our Reliance on Third Parties

We rely on third-party manufacturers to produce our preclinical and clinical drug supplies, and we intend to rely on third parties to produce commercial supplies of any approved product candidates.

We do not own or operate, and we do not expect to own or operate, facilities for product manufacturing, storage and distribution, or testing with respect to our product candidates, including ONC201, DSTAT or BCV. In the past, we have relied on third-party manufacturers for supply of our preclinical and clinical drug supplies. We expect that in the future we will continue to rely on such manufacturers for drug supply that will be used in clinical trials and for commercialization of any of our product candidates that receive regulatory approval.

In July 2019, we were assigned Cantex's rights under a supply agreement with Scientific Protein Laboratories LLC (SPL) pursuant to which SPL will exclusively produce DSTAT for us through October 2040. We have agreed that SPL will be our exclusive provider of DSTAT bulk drug substance during the term of the agreement.

Our reliance on third-party manufacturers entails risks, including:

- inability to meet our product specifications and quality requirements consistently;
- delay or inability to procure or expand sufficient manufacturing capacity;
- manufacturing and product quality issues related to scale-up of manufacturing;
- costs and validation of new equipment and facilities required for scale-up;
- failure to comply with cGMP and similar foreign standards;
- inability to negotiate manufacturing agreements with third parties under commercially reasonable terms;
- termination or nonrenewal of manufacturing agreements with third parties in a manner or at a time that is costly or damaging to us;
- reliance on a limited number of sources, and in some cases, single sources for product components, such that if we are unable to secure a sufficient supply of these product components, we will be unable to manufacture and sell our product candidates in a timely fashion, in sufficient quantities or under acceptable terms;
- lack of qualified backup suppliers for those components that are currently purchased from a sole or single source supplier;
- operations of our third-party manufacturers or suppliers could be disrupted by conditions unrelated to our business or operations, including the bankruptcy of the manufacturer or supplier, or other factors such as the impact of the ongoing COVID-19 pandemic;
- carrier disruptions or increased costs that are beyond our control; and
- failure to deliver our products under specified storage conditions and in a timely manner.

Any of these events could lead to clinical study delays, failure to obtain regulatory approval or impact our ability to successfully commercialize our products. Some of these events could be the basis for FDA or equivalent foreign regulator action, including injunction, recall, seizure, or total or partial suspension of production. The severity of the coronavirus (COVID-19) pandemic could make access to our existing supply chain difficult or impossible and could materially impact our business.

We rely on limited sources of supply for the drug components for each of our product candidates including, BCV, ONC201 and DSTAT, and any disruption in the chain of supply for any of these product candidates may cause delays in their development and commercialization.

Manufacturing of drug components is subject to certain FDA and comparable foreign qualifications with respect to manufacturing standards. We have validated the BCV drug substance manufacturing process at our selected contractor that will produce the commercial supply and possible procurement supply of drug substance. We have selected our BCV commercial and possible procurement tablet and suspension manufacturers and have validated both manufacturing processes. We are currently scaling up the tablet and suspension manufacturing process to meet forecasted procurement demand. There can be no assurance that the manufacturing at commercial scale will be successful or will be completed in a timely fashion. If we are unable to successfully scale up to meet commercial demands our business could be materially harmed.

We plan to validate the DSTAT drug substance and drug product processes prior to regulatory approval. It is our expectation that only one supplier of drug substance and one supplier of drug product will be qualified as vendors for both DSTAT and BCV with the FDA. If supply from an approved vendor is interrupted, there could be a significant disruption in commercial supply. An alternative vendor would need to be qualified through an NDA supplement which could result in further delay. The FDA or other regulatory agencies outside of the United States may also require additional studies if a new drug substance or drug product supplier is relied upon for commercial production.

These factors could cause the delay of clinical trials, regulatory submissions, required approvals or commercialization of DSTAT and BCV, and cause us to incur additional costs. As an example, we source a significant number of materials used in the manufacture of our products from China; the impact of the recent coronavirus outbreak could make access to our existing supply chain difficult or impossible and could materially harm our business. If our suppliers fail to deliver the required commercial quantities of active pharmaceutical ingredient on a timely basis and at commercially reasonable prices, and we are unable to secure one or more replacement suppliers capable of production at a substantially equivalent cost, our clinical trials for DSTAT and BCV may be delayed, which could inhibit our ability to generate revenues.

Manufacturing issues may arise that could increase product and regulatory approval costs or delay commercialization of BCV, ONC201 and DSTAT.

We have validated processes for drug substance and drug product production for BCV.

We plan to validate DSTAT drug substance and drug product processes prior to approval at our selected vendors. It is our expectation that only one supplier of drug substance and one supplier of drug product will be qualified as vendors for DSTAT with the FDA.

As more batch data is generated post-validation for both the drug substance and drug products, and as additional stability data is collected, issues may arise in our processes and stability programs which could require resolution in order to proceed with our planned clinical trials and obtain regulatory approval for the commercial marketing of DSTAT and BCV. In the future, we may identify significant impurities, which could result in increased scrutiny by the regulatory agencies, delays in clinical program and regulatory approval for DSTAT and BCV, increases in our operating expenses, or failure to obtain or maintain approval for either DSTAT, BCV or both.

We depend on SymBio for developing and commercializing BCV for human diseases other than orthopoxviruses, including smallpox.

In 2019, we entered into a licensing arrangement with SymBio, whereby SymBio is responsible for the future development and commercialization of BCV. Under this arrangement, SymBio is responsible for conducting preclinical studies and clinical trials, obtaining required regulatory approvals for BCV in non-orthopox indications (e.g. smallpox), and manufacturing and commercializing BCV in those indications. Our right to receive milestone payments under the licensing agreement depends on the achievement of certain development, regulatory and commercial milestones by SymBio and our ability to receive royalties under the agreement depends on SymBio's successful commercialization of BCV in the licensed indications.

The development and commercialization of the non-orthopox uses of BCV in humans and our ability to receive potential milestones and royalty payments under the license agreement with SymBio, would be adversely affected if SymBio:

- lacks or does not devote sufficient time and resource to the development and commercialization of BCV;
- lacks or does not devote sufficient capital to fund the development and commercialization of BCV;
- develops, either alone or with others, products that compete with BCV;
- fails to gain the requisite regulatory approvals for BCV;
- does not successfully commercialize BCV;
- does not conduct its activities in a timely manner;
- terminates its license with us;
- does not effectively pursue and enforce intellectual property rights relating to BCV; or
- merges with a third-party that wants to terminate the collaboration.

We have limited or no control over the occurrence of any of the foregoing. Furthermore, disagreements with SymBio could lead to litigation or arbitration, which could be time-consuming and expensive. If any of these issues arise, it may delay the development and commercialization milestones and royalties based on further development and sales of BCV.

We rely on third parties to conduct, supervise and monitor our clinical studies and related data, and if those third parties perform in an unsatisfactory manner, it may harm our business.

We rely on CROs and clinical trial sites to ensure the proper and timely conduct of our clinical trials. While we have agreements governing their activities, we have limited influence over their actual performance. We have relied and plan to continue to rely upon CROs to monitor and manage data for our ongoing clinical programs for our product candidates, as well as the execution of nonclinical studies. We control only certain aspects of our CROs' activities. Nevertheless, we are responsible for ensuring that each of our studies is conducted in accordance with the applicable protocol, legal, regulatory and scientific standards and our reliance on CROs does not relieve us of our regulatory responsibilities.

We and our CROs are required to comply with the FDA's guidance for clinical trials conducted within the jurisdiction of the United States (or the foreign regulatory authority equivalent for clinical trials conducted outside the jurisdiction of the United States), which follows the International Council for Harmonization Good Clinical Practice (ICH GCP), which are regulations and guidelines enforced by the FDA for all of our product candidates in clinical development. The FDA enforces the ICH GCP through periodic inspections of trial sponsors, principal investigators and clinical trial sites. If we or our CROs fail to comply with the ICH GCP, the clinical data generated in our clinical trials may be deemed unreliable and the FDA may require us to perform additional clinical trials before approving our marketing applications.

Our CROs are not our employees, and we cannot control whether or not they devote sufficient time and resources to our ongoing clinical and nonclinical programs. These CROs may also have relationships with other commercial entities, including our competitors, for whom they may also be conducting clinical studies, or other drug development activities which could harm our competitive position. We face the risk of potential unauthorized disclosure or misappropriation of our intellectual property

by CROs, which may reduce our trade secret protection and allow our potential competitors to access and exploit our proprietary technology.

If our CROs do not successfully carry out their contractual duties or obligations, fail to meet expected deadlines, or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements or for any other reasons, our clinical trials may be extended, delayed or terminated, and we may not be able to obtain regulatory approval for, or successfully commercialize ONC201, DSTAT, BCV or any other product candidates. Disagreements with our CROs over contractual issues, including performance, compliance or compensation could lead to termination of CRO agreements and/or delays in our clinical program and risks to the accuracy and usability of clinical data. As a result, our financial results and the commercial prospects for our product candidates that we develop would be harmed, our costs could increase, and our ability to generate revenues could be delayed.

Risks Related to Commercialization of Our Product Candidates

The commercial success of BCV, ONC201, DSTAT and any other product candidates will depend upon the acceptance of these products by the medical community, including physicians, patients, pharmacists, health care payers or government procurement agencies (e.g. BARDA).

If any of our product candidates receive marketing approval, they may nonetheless not gain sufficient market acceptance by physicians, patients, healthcare payers and others in the medical community. If these products do not achieve an adequate level of market acceptance, we may not generate significant product revenues and we may not become profitable. The degree of market acceptance of any of our product candidates will depend on a number of factors, including:

- demonstration of clinical safety and efficacy in our clinical trials;
- relative convenience, ease of administration and acceptance by physicians, patients, pharmacists and health care payers;
- prevalence and severity of any AEs;
- limitations or warnings contained in the FDA-approved labeling from Regulatory Authorities such as the FDA and EMA for the relevant product candidate;
- availability, efficacy and safety of alternative treatments;
- price and cost-effectiveness;
- effectiveness of our or any future collaborators' or competitor's sales and marketing strategies;
- ability to obtain hospital formulary approval;
- ability to ensure availability for product through appropriate channels;
- ability to maintain adequate inventory; and
- ability to obtain and maintain sufficient third-party coverage and adequate reimbursement, which may vary from country to country.

Even if we obtain regulatory approval, the granting authority may still impose significant restrictions on the indicated uses, distribution or marketing of our product candidates, including ONC201, DSTAT and BCV, or impose ongoing requirements for potentially costly post-approval studies or post-market surveillance. For example, the labeling ultimately approved for our product candidates, will likely include restrictions on use due to the specific patient population and manner of use in which the drug was evaluated and the safety and efficacy data obtained in those evaluations. In addition, the distribution of ONC201, DSTAT or BCV may be tightly controlled through a REMS with ETASU, which are required medical interventions or other actions healthcare professionals need to execute prior to prescribing or dispensing the drug to the patient. Some actions may also be required in order for the patient to continue on treatment. For example, the label for BCV may be required to include a boxed warning, or "black box," regarding BCV being carcinogenic, teratogenic and impairing fertility in animal studies. The BCV labeling may also include warnings pertaining to gastrointestinal AEs or liver-related safety laboratory value changes or black boxes related to the mortality disadvantage with extended dosing observed in the SUPPRESS trial.

If we are unable to establish sales and marketing capabilities or enter into agreements with third parties to market and sell our product candidates, we may be unable to generate any revenue.

We currently do not have an organization for the sales and distribution of pharmaceutical products. The cost of establishing and maintaining such an organization may exceed the cost-effectiveness of doing so. In order to market any products that may be approved we must establish our sales, marketing, managerial and other non-technical capabilities or make arrangements with third parties to perform these services. We may enter into strategic partnerships with third parties to commercialize our product candidates.

Our strategy for each of ONC201 and DSTAT, is to establish a specialty sales force and/or collaborate with third parties to promote the product to healthcare professionals and third-party payers in the United States and elsewhere. We may elect to launch with a contract sales organization and utilize accompanying commercial support services provided by a contract sales organization. Our future collaboration partners, if any, may not dedicate sufficient resources to the commercialization of our product candidates or may otherwise fail in their commercialization due to factors beyond our control. If we are unable to establish effective collaborations to enable the distribution and sale of our product candidates to healthcare professionals and in geographical regions, including the United States, that are not covered by our own marketing and sales force, or if our potential future collaboration partners do not successfully commercialize our product candidates, our ability to generate revenues from product sales, including sales of ONC201 and DSTAT, will be adversely affected.

Establishing an internal or contract sales force involves many challenges, including:

- recruiting and retaining talented people;
- training employees that we recruit;
- establishing compliance standards;
- setting the appropriate system of incentives;
- managing additional headcount;
- ensuring that appropriate support functions are in place to support sales force organizational needs; and
- integrating a new business unit into an existing corporate architecture.

If we are unable to establish our own sales force or negotiate a strategic partnership for the commercialization of our product candidates in any markets, we may be forced to delay the potential commercialization of our product candidates in those markets, reduce the scope of our sales or marketing activities for our product candidates in those markets or undertake the commercialization activities for BCV, ONC201 and DSTAT in those markets at our own expense. If we elect to increase our expenditures to fund commercialization activities ourselves, we will 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 will not be able to bring our product candidates to market or generate product revenue. Limited or lack of funding will impede our ability to achieve successful commercialization.

If we are unable to establish adequate sales, marketing and distribution capabilities, whether independently or with third parties, we may not be able to generate sufficient product revenue and may not become profitable. We will be competing with many companies that currently have extensive and well-funded marketing and sales operations. Without an internal team or the support of a third party to perform marketing and sales functions, we may be unable to compete successfully against these more established companies.

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

If we obtain approval to commercialize any products outside of the United States, a variety of risks associated with international operations could materially adversely affect our business.

If our product candidates are approved for commercialization, we may enter into agreements with third parties to market those product candidates outside the United States. We expect that we will be subject to additional risks related to entering into international business relationships, including:

- different regulatory requirements for drug approvals in the EU and other foreign countries;
- reduced protection for intellectual property rights;
- unexpected changes in tariffs, trade barriers and regulatory and labor requirements;
- economic weakness, including inflation, or political instability in particular foreign economies and markets;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- foreign taxes, including withholding of payroll taxes;
- foreign currency fluctuations, which could result in increased operating expenses and reduced revenues, and other obligations incident to doing business in another country;
- differing payer reimbursement regimes, governmental payers or patient self-pay systems and price controls;
- workforce uncertainty in countries where labor unrest is more common than in the United States;

- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad;
- regulatory risks associated with cross-border transportation of animal-sourced material;
- business interruptions resulting from geopolitical actions, including war and terrorism, or natural disasters and other events outside our control including epidemics, pandemics, earthquakes, typhoons, floods and fires; and
- regulatory and compliance risks that relate to maintaining accurate information and control over activities that may fall within the purview of the U.S. Foreign Corrupt Practices Act, its books and records provisions or its anti-bribery provisions, or similar anti-bribery or anti-corruption laws and regulations.

We have limited experience in these areas. In addition, there are complex regulatory, tax, labor and other legal requirements imposed by both the EU and many of the individual countries in Europe with which we will need to comply. Many U.S.-based biopharmaceutical companies have found the process of marketing their own products outside the United States to be very challenging.

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

The biotechnology and pharmaceutical industries are intensely competitive. We have competitors both in the United States and internationally, including major multinational pharmaceutical companies, biotechnology companies and universities and other research institutions.

Many of our competitors have substantially greater financial, technical, commercial and other resources, such as larger research and development staff, stronger intellectual property portfolios and experienced marketing and manufacturing organizations and established sales forces. Additional mergers and acquisitions in the biotechnology and pharmaceutical industries may result in even more resources being concentrated in our competitors.

Competition may increase further as a result of advances in the commercial applicability of technologies and greater availability of capital for investment in these industries. Our competitors may succeed in developing, acquiring or licensing, on an exclusive basis, drug products that are more effective or less costly than BCV, ONC201 and DSTAT or any other drug candidate that we are currently developing or that we may develop.

We will face competition from other drugs currently approved or that will be approved in the future for the same indications. Therefore, our ability to compete successfully will depend largely on our ability to:

- discover and develop medicines that are superior to other products in the market;
- demonstrate through our clinical trials that our product candidates, including BCV, ONC201 and DSTAT, are differentiated from existing and future therapies;
- attract qualified scientific, product development and commercial personnel;
- obtain and successfully defend and enforce patent and/or other proprietary protection for our medicines and technologies;
- obtain required regulatory approvals;
- successfully collaborate with pharmaceutical companies in the discovery, development and commercialization of new medicines;
- deliver a competitive value proposition compared to established competition and/or competitors who will enter the market before or after any of our product candidates, including BCV, ONC201 and DSTAT; and
- negotiate competitive pricing and reimbursement with third-party payers.

The availability of our competitors' products could affect the price we are able to charge, for any product candidate we develop. The inability to compete with existing or subsequently introduced drug products would have a material adverse impact on our business, financial condition and prospects.

Established pharmaceutical companies may invest heavily to accelerate discovery and development of novel compounds or to in-license novel compounds that could make our product candidates less competitive. In addition, any new product that competes with an approved product must demonstrate compelling advantages in efficacy, convenience, tolerability and safety in order to overcome price competition and to be commercially successful. Accordingly, our competitors may succeed in obtaining patent protection, receiving FDA approval or discovering, developing and commercializing medicines before we do, which would have a material adverse impact on our business.

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.

The success of our business depends primarily upon our ability to identify, develop and commercialize product candidates. Because we have limited financial and managerial resources, we focus on research programs and product candidates for specific indications. As a result, we may forego or delay pursuit of opportunities with other product candidates or other indications that later prove to have greater commercial potential.

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

- our research methodology or that of our collaboration partners may be unsuccessful in identifying potential product candidates;
- our potential product candidates may be shown to have harmful side effects or may have other characteristics that may make the products unmarketable or unlikely to receive marketing approval; and
- our collaboration partners may change their development profiles for potential product candidates or abandon a therapeutic area.

If any of these events occur, we may be forced to abandon our development efforts for a program or programs, which would have a material adverse effect on our business and could potentially cause us to cease operations. Research programs to identify new product candidates require substantial technical, financial and human resources. We may focus our research efforts and resources on potential programs or product candidates that ultimately prove to be unsuccessful.

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 in cases in which it would have been advantageous for us to retain sole development and commercialization rights.

Risks Related to Our Intellectual Property

If we are unable to obtain or protect intellectual property rights related to our products and product candidates, we may not be able to compete effectively in our market.

We rely upon a combination of patents, trade secret protection and confidentiality agreements to protect the intellectual property related to our products and product candidates. The strength of patents in the biotechnology and pharmaceutical field involves complex legal and scientific questions and can be uncertain. The patent applications that we own or in-license may fail to result in issued patents with claims that cover the products in the United States or in other countries. If this were to occur, early generic competition could be expected against any product candidates we may develop. There is no assurance that all of the potentially relevant prior art relating to our patents and patent applications has been found, which can invalidate a patent or prevent a patent from issuing based on a pending patent application. Even if patents do successfully issue, third parties may challenge their validity, enforceability, scope or ownership, which may result in such patents, or our rights to such patents, being narrowed or invalidated.

Furthermore, even if they are unchallenged, our patents and patent applications may not adequately protect our intellectual property or prevent others from designing around our claims. If the patent applications we hold or license with respect to any of our product candidates fails to issue or if their breadth or strength of protection is threatened, it could dissuade companies from collaborating with us to develop, and threaten our ability to commercialize, our products. We cannot offer any assurances about which, if any, patents will issue or whether any issued patents will be found not invalid and not unenforceable, will go unthreatened by third parties or will adequately protect our products and product candidates. Further, if we encounter delays in regulatory approvals, the period of time during which we could market DSTAT and BCV under patent protection could be reduced. Since patent applications in the United States and most other countries are confidential for a period of time after filing, and some remain so until issued, we cannot be certain that we or our licensors were the first to file any patent application related to any of our product candidates. Furthermore, if third parties have filed such patent applications, an interference proceeding in the United States can be provoked by a third party or instituted by us to determine who was the first to invent any of the subject matter covered by the patent claims of our applications. An unfavorable outcome could require us to cease using the related technology or to attempt to license it from the prevailing party, which may not be possible. In addition to the protection afforded by patents, we rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable, processes for which patents are difficult to enforce and other elements of our drug discovery and development processes that involve proprietary know-how, information or technology that is not covered by patents. Although we expect all of our employees to assign their inventions to us, and all of our employees, consultants, advisors and any third parties who have access to our proprietary know-how, information or technology to enter into confidentiality agreements, we

cannot provide any assurances that all such agreements have been duly executed, that such agreements provide adequate protection and will not be breached, that our trade secrets and other confidential proprietary information will not otherwise be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. If we are unable to prevent material disclosure of the non-patented intellectual property related to our technologies to third parties, and there is no guarantee that we will have any such enforceable trade secret protection, we may not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business, results of operations and financial condition.

Further, the laws of some foreign countries do not protect patents and other proprietary rights to the same extent or in the same manner as the laws of the United States. As a result, we may encounter significant problems in protecting and defending our intellectual property abroad. We may also fail to pursue or obtain patents and other intellectual property protection relating to our products and product candidates in all foreign countries.

Finally, certain of our activities and our licensors' activities have been funded, and may in the future be funded, by the U.S. federal government. When new technologies are developed with U.S. federal government funding, the government obtains certain rights in any resulting patents, including a nonexclusive license authorizing the government to use the invention for non-commercial purposes. These rights may permit the government to disclose our confidential information to third parties and to exercise "march-in" rights to use or allow third parties to use our patented technology. The government can exercise its march-in rights if it determines that action is necessary because we fail to achieve practical application of the U.S. government-funded technology, because action is necessary to alleviate health or safety needs, to meet requirements of federal regulations or to give preference to U.S. industry. In addition, U.S. government-funded inventions must be reported to the government, U.S. government funding must be disclosed in any resulting patent applications, and our rights in such inventions may be subject to certain requirements to manufacture products in the United States.

Third-party claims of intellectual property infringement may prevent or delay our development and commercialization efforts or otherwise affect our business.

Our commercial success depends in part on our avoiding infringement and other violations of the patents and proprietary rights of third parties. There is a substantial amount of litigation, both within and outside the United States, involving patent and other intellectual property rights in the biotechnology and pharmaceutical industries, including patent infringement lawsuits, interferences, oppositions and inter party reexamination proceedings before the United States Patent and Trademark Office (U.S. PTO) and its foreign counterparts. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we and our collaborators are developing product candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, and as we gain greater visibility and market exposure as a public company, the risk increases that our product candidates or other business activities may be subject to claims of infringement of the patent and other proprietary rights of third parties. Third parties may assert that we are employing their proprietary technology without authorization. There may be third-party patents or patent applications with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of ONC201, DSTAT, BCV and/or any other product candidates. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that our product candidates may infringe. In addition, third parties may obtain patents in the future and claim that use of our technologies infringes upon these patents. If any third-party patents were held by a court of competent jurisdiction to cover the manufacturing process of any of our product candidates, any molecules formed during the manufacturing process or any final product itself, the holders of any such patents may be able to block our ability to commercialize such product candidate unless we obtained a license under the applicable patents, or until such patents expire.

Similarly, if any third-party patent were held by a court of competent jurisdiction to cover aspects of our formulations, processes for manufacture or methods of use, including combination therapy, the holders of any such patent may be able to block our ability to develop and commercialize the applicable product candidate unless we obtained a license or until such patent expires. In either case, such a license may not be available on commercially reasonable terms or at all. In addition, we may be subject to claims that we are infringing other intellectual property rights, such as trademarks or copyrights, or misappropriating the trade secrets of others, and to the extent that our employees, consultants or contractors use intellectual property or proprietary information owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions.

Parties making claims against us may obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize one or more of our product candidates. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. In the event of a successful infringement or other intellectual property claim against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, obtain one or more licenses from third parties, pay

royalties or redesign our affected products, which may be impossible or require substantial time and monetary expenditure. We cannot predict whether any such license would be available at all or whether it would be available on commercially reasonable terms. Furthermore, even in the absence of litigation, we may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates, and we have done so from time to time. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, if at all. In that event, we would be unable to further develop and commercialize one or more of our product candidates, which could harm our business significantly. We cannot provide any assurances that third-party patents do not exist which might be enforced against our products or product candidates, resulting in either an injunction prohibiting our sales, or, with respect to our sales, an obligation on our part to pay royalties and/or other forms of compensation to third parties.

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

Competitors may infringe or otherwise violate our patents, the patents of our licensors or our other intellectual property rights. To counter infringement or unauthorized use, we may be required to file legal claims, which can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent of ours or our licensors is not valid or is unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation or defense proceedings could put one or more of our patents at risk of being invalidated or interpreted narrowly and could put our patent applications at risk of not issuing. The initiation of a claim against a third party may also cause the third party to bring counterclaims against us.

We may not be able to prevent, alone or with our licensors, misappropriation of our intellectual property rights, particularly in countries where the laws may not protect those rights as fully as in the United States. Our business could be harmed if in a litigation the prevailing party does not offer us a license on commercially reasonable terms. Any litigation or other proceedings to enforce our intellectual property rights may fail, and even if successful, may result in substantial costs and distract our management and other employees.

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. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of our common stock.

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

Periodic maintenance fees on any issued patent are due to be paid to the U.S. PTO and foreign patent agencies in several stages over the lifetime of the patent. The U.S. PTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process.

While an inadvertent lapse can in many cases be cured by payment of a late fee or by other means in accordance with the applicable rules, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. Non-compliance events that could result in abandonment or lapse of a patent or patent application include, but are not limited to, failure to respond to official actions within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents. If we or our licensors that control the prosecution and maintenance of our licensed patents fail to maintain the patents and patent applications covering our product candidates, we may lose our rights and our competitors might be able to enter the market, which would have a material adverse effect on our business.

Risks Related to Our United States Government Contracts and Grants

There can be no assurances that we will be able to enter into a contract with BARDA to act as the sole supplier for the procurement of BCV for the treatment of smallpox.

In April 2015, BARDA posted a notice of intent to use other than full and open competition to award a sole source contract to us for the procurement of BCV for the treatment of smallpox. In May 2015, BARDA posted an approved justification for the use of other than full and open competition for the contract. In July 2015, BARDA issued a RFP entitled “2015 Procurement of a Second Smallpox Antiviral Drug for the Strategic National Stockpile.” In August 2015, we submitted a response to the RFP

and we subsequently engaged in discussions with BARDA regarding our response. The issuance of that RFP did not culminate with agreement for the sole source supply of BCV for the Strategic National Stockpile (SNS).

We remain in discussions with BARDA regarding the potential to supply BCV to the SNS, however, there can be no assurances that a future RFP for BCV procurement will be issued.

Furthermore, in the event that BARDA issues an RFP for procurement of a smallpox antiviral therapeutic, there can be no assurance that we would reach agreement with BARDA on terms related to the manufacture and delivery of BCV to the SNS. Among the material terms to be negotiated and agreed to are: price, volume, and payment and delivery schedules, as we currently do not have BCV commercial product in inventory that would be available for immediate delivery.

Unfavorable provisions in government contracts, including our contract with BARDA, may harm our business, financial condition and operating results.

United States government contracts typically contain unfavorable provisions and are subject to audit and modification by the government at its sole discretion, which will subject us to additional risks. For example, under our contract with BARDA, the U.S. government has the power to unilaterally:

- audit and object to any BARDA contract-related costs and fees on grounds that they are not allowable under the FAR, and require us to reimburse all such costs and fees;
- suspend or prevent us for a set period of time from receiving new contracts or extending our existing contract based on violations or suspected violations of laws or regulations;
- claim nonexclusive, nontransferable rights to product manufactured and intellectual property developed under the BARDA contract and may, under certain circumstances, such as circumstances involving public health and safety, license such inventions to third parties without our consent;
- cancel, terminate or suspend our BARDA contract based on violations or suspected violations of laws or regulations;
- terminate our BARDA contract in whole or in part for the convenience of the government for any reason or no reason, including if funds become unavailable to the applicable governmental agency;
- reduce the scope and value of our BARDA contract;
- decline to exercise an option to continue the BARDA contract;
- direct the course of a development program in a manner not chosen by the government contractor;
- require us to perform the option segments even if doing so may cause us to forego or delay the pursuit of other opportunities with greater commercial potential;
- take actions that result in a longer development timeline than expected; and
- change certain terms and conditions in our BARDA contract.

The U.S. government also has the right to terminate the BARDA contract if termination is in the government's interest, or if we default by failing to perform in accordance with the milestones set forth in the contract. Termination-for-convenience provisions generally enable us to recover only our costs incurred or committed (plus a portion of the agreed fee) and settlement expenses on the work completed prior to termination. Except for the amount of services received by the government, termination-for-default provisions do not permit recovery of fees.

In addition, we must comply with numerous laws and regulations that affect how we conduct business with the United States government. Among the most significant government contracting regulations that affect our business are:

- FAR, and agency-specific regulations supplements to the FAR, which comprehensively regulate the procurement, formation, administration and performance of government contracts and implement federal procurement policy in numerous areas, such as employment practices, protection of the environment, accuracy and retention periods of records, recording and charging of costs, treatment of laboratory animals and human subject research;
- business ethics and public integrity obligations, which govern conflicts of interest and the hiring of former government employees, restrict the granting of gratuities and funding of lobbying activities and incorporate other requirements such as the Anti-Kickback Act and the Foreign Corrupt Practices Act;
- export and import control laws and regulations; and
- laws, regulations and executive orders restricting the use and dissemination of information classified for national security purposes and the exportation of certain products and technical data.

Furthermore, we may be required to enter into agreements and subcontracts with third parties, including suppliers, consultants and other third-party contractors, in order to satisfy our contractual obligations pursuant to our agreements with the U.S. government. Negotiating and entering into such arrangements can be time-consuming and we may not be able to reach

agreement with such third parties. Any such agreement must also be compliant with the terms of our government contract. Any delay or inability to enter into such arrangements or entering into such arrangements in a manner that is non-compliant with the terms of our contract, may result in violations of our contract.

As a result of these unfavorable provisions, we must undertake significant compliance activities. The diversion of resources from commercial programs to these compliance activities, as well as the exercise by the U.S. government of any rights under these provisions, could materially harm our business.

Our business is subject to audit by the U.S. government, including under our contract with BARDA, and a negative audit could adversely affect our business.

United States government agencies, such as the DHHS, routinely audit and investigate government contractors and recipients of federal grants, including our contract with BARDA. These agencies review a contractor's performance under its contracts, cost structure and compliance with applicable laws, regulations and standards.

The DHHS can also review the adequacy of, and a contractor's compliance with, its internal control systems and policies, including the contractor's purchasing, property, estimating, compensation and management information systems. Any costs found to be improperly allocated to a specific contract will not be reimbursed, while such costs already reimbursed must be refunded. If an audit uncovers improper or illegal activities, we may be subject to civil and criminal penalties and administrative sanctions, including:

- termination of contracts;
- forfeiture of profits;
- suspension of payments;
- fines; and
- suspension or prohibition from conducting business with the U.S. government.

In addition, we could suffer serious reputational harm if allegations of impropriety were made against us by the U.S. government, which could adversely affect our business.

Agreements with government agencies may lead to claims against us under the Federal False Claims Act, and these claims could result in substantial fines and other penalties.

The biopharmaceutical industry is, and in recent years has been, under heightened scrutiny as the subject of government investigations and enforcement actions. Our BARDA contract is subject to substantial financial penalties under the Federal Civil Monetary Penalties Act and the False Claims Act. The False Claims Act imposes liability on any person who, among other things, knowingly presents, or causes to be presented, a false record or statement material to a false or fraudulent claim paid or approved by the government. Under the False Claims Act's "whistleblower" provisions, private enforcement of fraud claims against businesses on behalf of the U.S. government has increased due in part to amendments to the False Claims Act that encourage private individuals to sue on behalf of the government. These whistleblower suits, known as *qui tam* actions, may be filed by private individuals, including present and former employees. The False Claims Act provides for treble damages and significant civil monetary penalties per false claim. If our operations are found to be in violation of any of these laws, or any other governmental regulations that apply to us, we may be subject to penalties, including civil, criminal and administrative penalties, damages, fines, exclusion from the Medicare and Medicaid programs, and the curtailment or restructuring of our operations. Any penalties, damages, fines, exclusions, curtailment, or restructuring of our operations could adversely affect our ability to operate our business and our financial results.

Risks Related to Our Business Operations and Industry

Increasing demand for compassionate use of our unapproved therapies could result in losses.

Recent media attention to individual patients' expanded access requests has resulted in the introduction of legislation at the local and national level referred to as "Right to Try" laws, such as the Right to Try Act, which are intended to give patients access to unapproved therapies. New and emerging legislation regarding expanded access to unapproved drugs for life-threatening illnesses could negatively impact our business in the future. In addition, during 2014, we were the target of an active and disruptive social media campaign related to a request for access to BCV. If we experience similar social media campaigns in the future, we may experience significant disruption to our business which could result in losses.

A possible consequence of both activism and legislation in this area is the need for us to initiate an unanticipated expanded access program or to make ONC201, DSTAT or BCV more widely available sooner than anticipated. We are a small company with limited resources and unanticipated trials or access programs could result in diversion of resources from our primary goals.

In addition, patients who receive access to unapproved drugs through compassionate use or expanded access programs have life-threatening illnesses and have exhausted all other available therapies. The risk for serious adverse events in this patient population is high which could have a negative impact on the safety profile of our product candidates, which could cause significant delays or an inability to successfully commercialize them, which could materially harm our business. We may also need to restructure or pause ongoing compassionate use and/or expanded access programs in order to perform the controlled clinical trials required for regulatory approval and successful commercialization of our product candidates, which could prompt adverse publicity or other disruptions related to current or potential participants in such programs. The BCV compassionate use program ended in the third quarter of 2020.

If we fail to comply with the extensive legal and regulatory requirements affecting the health care industry, we could face increased costs, delays in the development of our product candidates, penalties and a loss of business.

Our activities, and the activities of our collaborators, partners and third-party providers, are subject to extensive government regulation and oversight both in the United States and in foreign jurisdictions. The FDA and comparable agencies in other jurisdictions directly regulate many of our most critical business activities, including the conduct of preclinical and clinical studies, product manufacturing, advertising and promotion, product distribution, adverse event reporting and product risk management. States increasingly have been placing greater restrictions on the marketing practices of healthcare companies. In addition, pharmaceutical and biotechnology companies have been the target of lawsuits and investigations alleging violations of government regulations, including claims asserting submission of incorrect pricing information, impermissible off-label promotion of pharmaceutical products, payments intended to influence the referral of federal or state healthcare business, submission of false claims for government reimbursement, antitrust violations, violations of the Foreign Corrupt Practices Act, or violations related to environmental matters. Violations of governmental regulation may be punishable by criminal, civil and administrative sanctions, including fines and civil monetary penalties and exclusion from participation in government programs, including Medicare and Medicaid. In addition to penalties for violation of laws and regulations, we could be required to delay or terminate the development of our product candidates, or we could be required to repay amounts we received from government payers, or pay additional rebates and interest if we are found to have miscalculated the pricing information we have submitted to the government. Whether or not we have complied with the law, an investigation into alleged unlawful conduct could increase our expenses, damage our reputation, divert management time and attention and adversely affect our business.

Our future success depends on our ability to retain key executives and to attract, retain and motivate qualified personnel.

We are highly dependent on the principal members of our executive team. While we have entered into employment agreements or offer letters with each of our executive officers, any of them could leave our employment at any time, as all of our employees are “at will” employees. To help attract, retain, and motivate qualified employees, we use share-based incentive awards such as employee stock options and restricted stock units. Due to the decline in our stock price that has occurred since December 2015, a large percentage of the options held by our employees are underwater. As of December 31, 2020, approximately 21% of all outstanding options had an exercise price above the closing price of the stock on that date. As a result, the current situation provides a considerable challenge to maintaining employee motivation, as well as creating a serious threat to retention until a recovery commences. If our share-based compensation ceases to be viewed as a valuable benefit, our ability to attract, retain, and motivate employees could be weakened, which could harm our results of operations.

We do not maintain “key person” insurance for any of our executives or other employees. Recruiting and retaining other qualified employees for our business, including scientific and technical personnel, will also be critical to our success. There is currently a shortage of appropriately skilled executives in our industry, which is likely to continue. We also experience competition for the hiring of scientific and clinical personnel from universities and research institutions. As a result, competition for skilled personnel is intense and the turnover rate can be high. We may not be able to attract and retain personnel on acceptable terms given the competition among numerous pharmaceutical and biotechnology companies for similar personnel. In addition, failure of any of our clinical studies may make it more challenging to recruit and retain qualified personnel. The inability to recruit or loss of the services of any executive or key employee may adversely affect the progress of our research, development and commercialization objectives.

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, which could also adversely affect the progress of our research, development and commercialization objectives.

Potential product liability lawsuits against us could cause us to incur substantial liabilities and to limit commercialization of any products that we may develop.

The use of our product candidates, including BCV, ONC201 and DSTAT, in clinical studies and the sale of any products for which we obtain marketing approval exposes us to the risk of product liability claims. Product liability claims might be brought against us by consumers, health care providers, pharmaceutical companies or others selling or otherwise coming into contact with our products. On occasion, large judgments have been awarded in class action lawsuits based on drugs that had unanticipated adverse effects. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- impairment of our business reputation and significant negative media attention;
- withdrawal of participants from our clinical studies;
- significant costs to defend the related litigation;
- distraction of management's attention from our primary business;
- substantial monetary awards to patients or other claimants;
- inability to commercialize our product candidates, including BCV, ONC201 and DSTAT; and
- decreased demand for our product candidates, if approved for commercial sale.

We currently carry $15 million in product liability insurance covering our clinical trials. Our current product liability insurance coverage may not be sufficient to reimburse us for any expenses or losses we may suffer. Moreover, insurance coverage is becoming increasingly expensive and in the future we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses due to liability. If and when we obtain marketing approval for our product candidates, we intend to expand our insurance coverage to include the sale of commercial products; however, we may be unable to obtain product liability insurance on commercially reasonable terms or in adequate amounts. A successful product liability claim or series of claims brought against us could cause our stock price to decline and, if judgments exceed our insurance coverage, could adversely affect our results of operations and business.

The COVID-19 pandemic, which began in late 2019 and has spread worldwide, may affect our ability to initiate or continue our planned, ongoing and future clinical trials, disrupt regulatory activities, disrupt our ability to maintain a commercial infrastructure for our products or have other adverse effects on our business and operations. In addition, this pandemic has caused substantial disruption in the financial markets and may adversely impact economies worldwide, both of which could result in adverse effects on our business and operations.

The COVID-19 pandemic, which began in December 2019, has spread worldwide, causing many governments to implement measures to slow the spread of the outbreak through quarantines, strict travel restrictions, heightened border scrutiny, and other measures. The outbreak and government measures taken in response have also had a significant impact, both direct and indirect, on businesses and commerce, as worker shortages have occurred; supply chains have been disrupted; facilities and production have been suspended; and demand for certain goods and services, such as medical services and supplies, has spiked, while demand for other goods and services, such as travel, has fallen. The future progression of the pandemic and its effects on our business and operations are uncertain.

In the event of a continuation of shelter-in-place orders and/or other mandated local travel restrictions, our employees conducting research and development activities may not be able to access our research space, and our core activities may be significantly limited or curtailed, possibly for an extended period of time. In light of the pandemic, we may choose to pause certain research programs, delay the start of certain longer-term clinical studies and limit hiring.

We may face difficulties recruiting or retaining patients in our ongoing clinical trials because of the pandemic. For example, patients for our recently initiated trial of DSTAT as a treatment for AML may be unable or unwilling to visit clinical trial sites which may impact the collection of important clinical trial data or such a delay may alter DSTAT's potential time to market which could reduce its commercial attractiveness in a competitive AML marketplace. In addition, limitations in the ability to visit sites may adversely affect, our enrollment timelines for our clinical trials, and may adversely affect the timing of completion of our clinical trials or our ability to complete clinical trials in a fully compliant manner. Additionally, the potential suspension of clinical trial activity at clinical trial sites may have an adverse impact on our clinical trial plans and timelines.

We may face disruptions that may affect our ability to initiate and complete clinical trials including disruptions in procuring items that are essential for our research and development activities, including, for example, raw materials used in the manufacturing of our product candidates and laboratory supplies for planned and ongoing clinical trials, in each case, for which there may be shortages because of ongoing efforts to address the outbreak. Site initiation, participant recruitment and enrollment, participant dosing, distribution of clinical trial materials, study monitoring and data analysis may be paused or delayed due to changes in hospital or university policies, federal, state or local regulations, prioritization of hospital resources

toward pandemic efforts, or other reasons related to the pandemic. We may face manufacturing disruptions or disruptions related to the ability to obtain necessary institutional review board, or IRB, or other necessary site approvals, as well as other delays at clinical trial sites.

The response to the COVID-19 pandemic may redirect resources with respect to regulatory and intellectual property matters in a way that would adversely impact our ability to progress regulatory approvals and protect our intellectual property. In addition, we may face impediments to regulatory meetings and approvals due to measures intended to limit in-person interactions.

The COVID-19 pandemic has already caused significant disruptions in the financial markets, and may continue to cause such disruptions, which could impact our ability to raise additional funds through public offerings and may also impact the volatility of our stock price and trading in our stock. Moreover, it is possible the pandemic will significantly impact economies worldwide, which could result in adverse effects on our business and operations. We cannot be certain what the overall impact of the COVID-19 pandemic will be on our business and it has the potential to adversely affect our business, financial condition, results of operations, and prospects.

We may experience difficulties in integrating the operations of Oncoceutics into our business and in realizing the expected benefits of the merger with Oncoceutics.

The success of our merger with Oncoceutics (the Merger) will depend in part on our ability to realize the anticipated benefits from combining the operations of Oncoceutics with our business in an efficient and effective manner. The integration process could take longer than anticipated and could result in the loss of key employees, the disruption of each company's ongoing businesses, tax costs or inefficiencies, or inconsistencies in standards, controls, information technology systems, procedures and policies, any of which could adversely affect our ability to achieve the anticipated benefits of the Merger, and could harm our financial performance and impair stockholder value. If we are unable to successfully or timely integrate the operations of Oncoceutics with our business, we may incur unanticipated liabilities and be unable to realize the revenue growth, synergies and other anticipated benefits resulting from the Merger, and our business, results of operations and financial condition could be materially and adversely affected. We have incurred significant costs in connection with the Merger. The substantial majority of these costs are non-recurring expenses related to the Merger. We may incur additional costs in the integration of Oncoceutics, and may not achieve cost synergies and other benefits sufficient to offset the incremental costs of the Merger.

Risks Related To Our Common Stock

The market price of our common stock is likely to be volatile, and you may not be able to resell your shares at or above your purchase price.

The trading price of our common stock has been volatile, and is likely to continue to be volatile for the foreseeable future. Our stock price is subject to wide fluctuations in response to a variety of factors, including the following:

- results of clinical trials of our product candidates or those of our competitors;
- any delay in filing an application for any of our product candidates and any adverse development or perceived adverse development with respect to regulatory review of that application;
- failure to successfully develop and commercialize our product candidates, including BCV, ONC201 and DSTAT;
- termination of any of our license or collaboration agreements;
- any agency or judicial enforcement actions against us;
- inability to obtain additional funding;
- regulatory or legal developments in the United States and other countries applicable to our product candidates;
- adverse regulatory decisions;
- changes in the structure of healthcare payment systems;
- inability to obtain adequate product supply for our product candidates, or the inability to do so at acceptable prices;
- introduction of new products, services or technologies by our competitors;
- failure to meet or exceed financial projections we provide to the public;
- failure to meet or exceed the estimates and projections of the investment community;
- changes in the market valuations of similar companies;
- market conditions in the pharmaceutical and biotechnology sectors, and the issuance of new or changed securities analysts' reports or recommendations;
- announcements of significant acquisitions, strategic partnerships, joint ventures or capital commitments by us or our competitors;

- significant lawsuits (including patent or stockholder litigation), and disputes or other developments relating to proprietary rights (including patents, litigation matters and our ability to obtain patent protection for our technologies);
- additions or departures of key scientific or management personnel;
- sales of our common stock by us or our stockholders in the future;
- trading volume of our common stock;
- general economic, industry and market conditions, including the impact of the ongoing COVID-19 pandemic; and
- the other factors described in this "Risk Factors" section.

In addition, the stock market in general, and The Nasdaq Global Market in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of these companies. Broad market and industry factors may negatively affect the market price of our common stock, regardless of our actual operating performance.

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

Based upon shares of common stock outstanding as of December 31, 2020, our then executive officers, directors, 5% stockholders (known to us through available information) and their affiliates beneficially owned approximately 37.2% of our voting stock. Therefore, these stockholders have the ability to substantially influence us through this ownership position. For example, these stockholders, if they choose to act together, may be able to influence the election of directors, amendments of our organizational documents, or approval of any merger, sale of assets, or other major corporate transaction. This concentration of voting power could delay or prevent an acquisition of our company on terms that other stockholders may desire.

Failure to establish and maintain adequate finance infrastructure and accounting systems and controls could impair our ability to comply with the financial reporting and internal controls requirements for publicly traded companies.

As a public company, we operate in an increasingly demanding regulatory environment, which requires us to comply with the Sarbanes-Oxley Act of 2002, and the related rules and regulations of the Securities and Exchange Commission, expanded disclosure requirements, accelerated reporting requirements and more complex accounting rules. Company responsibilities required by the Sarbanes-Oxley Act include establishing and maintaining corporate oversight and adequate internal control over financial reporting and disclosure controls and procedures. Effective internal controls are necessary for us to produce reliable financial reports and are important to help prevent financial fraud.

Our compliance with Section 404 of the Sarbanes-Oxley Act has required and will continue to require that we incur substantial accounting expense and expend significant management efforts. In this or future years, our testing, or the subsequent testing by our independent registered public accounting firm, may reveal deficiencies in our internal controls that we would be required to remediate in a timely manner so as to be able to comply with the requirements of Section 404 of the Sarbanes-Oxley Act each year. If we are not able to comply with the requirements of Section 404 of the Sarbanes-Oxley Act in a timely manner each year, we could be subject to sanctions or investigations by the Securities and Exchange Commission, The Nasdaq Stock Market or other regulatory authorities which would require additional financial and management resources and could adversely affect the market price of our common stock. Furthermore, if we cannot provide reliable financial reports or prevent fraud, our business and results of operations could be harmed and investors could lose confidence in our reported financial information.

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

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

In July 2019, we entered into a license agreement with Cantex where we acquired an exclusive license to global development and commercialization rights to DSTAT. As partial consideration for our rights under the license agreement, we issued to Cantex 10,000,000 shares of our common stock. We are continuing to review additional potential transactions to add to our pipeline of product candidates, and these transactions could involve the issuance of additional shares of common stock or other

equity securities. On January 7, 2021, we acquired Oncoceutics, a privately-held, clinical-stage biotechnology company developing imipridones, including ONC201. As part of the consideration for the acquisition, we paid an upfront cash payment of approximately $25.0 million and issued an aggregate of 8,723,769 shares of our common stock.

Pursuant to our 2013 Equity Incentive Plan (the 2013 Plan), our management is authorized to grant stock options to our employees, directors and consultants. The number of shares available for future grant under our 2013 Plan will automatically increase on January 1st each year, through January 1, 2023, by an amount equal to 4.0% of all shares of our capital stock outstanding as of December 31st of the preceding calendar year, subject to the ability of our board of directors to take action to reduce the size of such increase in any given year. In addition, our board of directors may grant or provide for the grant of rights to purchase shares of our common stock pursuant to the terms of our 2013 Employee Stock Purchase Plan (ESPP). The number of shares of our common stock reserved for issuance under our ESPP will automatically increase on January 1st each year, through January 1, 2023, by an amount equal to the lesser of 422,535 shares or one percent of all shares of our capital stock outstanding as of December 31st of the preceding calendar year, subject to the ability of our board of directors to take action to reduce the size of such increase in any given year. Unless our board of directors elects not to increase the number of shares underlying our 2013 Plan and ESPP each year, our stockholders may experience additional dilution, which could cause our stock price to fall.

We have broad discretion in the use of the net proceeds from our financing transactions and may not use them effectively.

Our management has broad discretion in the application of the net proceeds from our financing transactions. Because of the number and variability of factors that will determine our use of the net proceeds from our financing transactions, their ultimate use may vary substantially from their currently intended use. The failure by our management to apply these funds effectively could result in financial losses that could have a material adverse effect on our business, cause the price of our common stock to decline and delay the development of our product candidates. Pending their use, we have invested the net proceeds from our financing transactions in short-term, investment-grade, interest-bearing securities. These investments may not yield a favorable return to our stockholders.

Volatility in our stock price could subject us to securities class action litigation.

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

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

On December 22, 2017, President Trump signed into law the Tax Act which significantly revises the Internal Revenue Code of 1986, as amended. The Tax Act, among other things, contains significant changes to corporate taxation, including reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, limitation of the tax deduction for interest expense to 30% of adjusted earnings (except for certain small businesses), limitation of the deduction for net operating losses generated in taxable years beginning after December 31, 2017, to 80% of current year taxable income, elimination of most carrybacks of net operating losses arising in taxable years ending after December 31, 2017, one time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, elimination of U.S. tax on foreign earnings (subject to certain important exceptions), immediate deductions for certain new investments instead of deductions for depreciation expense over time, and modifying or repealing many business deductions and credits. Notwithstanding the reduction in the corporate income tax rate, the overall impact of the Tax Act is uncertain and our business and financial condition could be adversely affected. In addition, it is uncertain if and to what extent various states will conform to the Tax Act. The impact of this tax reform on holders of our common stock is also uncertain and could be adverse. We urge our stockholders to consult with their legal and tax advisors with respect to this legislation and the potential tax consequences of investing in or holding our common stock.

Our effective tax rate may fluctuate, and we may incur obligations in tax jurisdictions in excess of accrued amounts.

Our effective tax rate is derived from a combination of applicable tax rates in the various places that we operate. In preparing our financial statements, we estimate the amount of tax that will become payable in each of such places. Nevertheless, our effective tax rate may be different than experienced in the past due to numerous factors, including passage of the Tax Act, the results of examinations and audits of our tax filings, our inability to secure or sustain acceptable agreements with tax authorities, changes in accounting for income taxes and changes in tax laws. Any of these factors could cause us to experience an effective tax rate significantly different from previous periods or our current expectations and may result in tax obligations in excess of amounts accrued in our financial statements.

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

Our U.S. net operating loss (NOL) carryforwards generated in tax years ending on or prior to December 31, 2017, are only permitted to be carried forward for 20 years under applicable U.S. tax law. Under the Tax Act, our federal NOLs generated in tax years ending after December 31, 2017, may be carried forward indefinitely. The CARES Act revised the NOL limitations such that the of federal NOLs in tax years beginning after December 31, 2020, is limited to 80% of taxable income. It is uncertain if and to what extent various states will conform to the Tax Act. In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, and corresponding provisions of state law, if a corporation undergoes an "ownership change," which is generally defined as a greater than 50% change, by value, in its equity ownership over a three-year period, the corporation's ability to use its pre-change NOL carryforwards and other pre-change U.S. tax attributes (such as research tax credits) to offset its post-change income or taxes may be limited. We have determined that a Section 382 ownership change occurred in 2002 and 2007 resulting in limitations of at least $64,000 and $762,000, respectively, of losses incurred prior to the respective ownership change dates. In addition, we have determined that another Section 382 ownership change occurred in 2013 with our IPO, our most recent private placement and other transactions that have occurred since 2007, resulting in a limitation of at least $6.7 million of losses incurred prior to the ownership change date. We may also experience ownership changes in the future as a result of subsequent shifts in our stock ownership. As a result, our pre-2018 NOL carryforwards may expire prior to being used, and our NOL carryforwards generated in 2018 and thereafter will be subject to a percentage limitation. In addition, it is possible that we have in the past undergone, and in the future may undergo, additional ownership changes that could limit our ability to use all of our pre-change NOLs and other pre-change tax attributes (such as research tax credits) to offset our post-change income or taxes. Similar provisions of state tax law may also apply to limit our use of accumulated state tax attributes. In addition, at the state level, there may be periods during which the use of NOLs is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed. As a result, we may be unable to use all or a material portion of our NOLs and other tax attributes.

Because we do not anticipate paying any cash dividends on our common stock in the foreseeable future, capital appreciation, if any, would be your sole source of gain.

We have never declared or paid any cash dividends on our common stock. We currently anticipate that we will retain any future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. As a result, capital appreciation, if any, of our common stock would be your sole source of gain on an investment in our common stock for the foreseeable future.

Provisions in our corporate charter documents and under Delaware law could make it more difficult for a third party to acquire us or increase the cost of acquiring us, even if doing so would benefit our stockholders and may prevent attempts by our stockholders to replace or remove our current management.

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

- authorizing the issuance of "blank check" preferred stock, the terms of which may be established and shares of which may be issued without stockholder approval which could be used to institute a "poison pill" that would work to dilute the stock ownership of a potential hostile acquirer, effectively preventing acquisitions that have not been approved by our board of directors;
- allowing the authorized number of our directors to be changed only by resolution of our board of directors;
- limiting the removal of directors;
- creating a staggered board of directors;
- requiring that stockholder actions must be effected at a duly called stockholder meeting and prohibiting stockholder actions by written consent;
- eliminating the ability of stockholders to call a special meeting of stockholders; and
- establishing advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted upon at duly called stockholder meetings.

The amendment of any of these provisions, with the exception of the ability of our board of directors to issue shares of preferred stock and designate any rights, preferences and privileges thereto, would require the affirmative vote of the holders of at least 66 2/3 percent of the voting power of all of our then outstanding common stock.

These provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management. In addition, we are subject to Section 203 of the Delaware General Corporation Law, which

generally prohibits a Delaware corporation from engaging in any of a broad range of business combinations with an interested stockholder for a period of three years following the date on which the stockholder became an interested stockholder, unless such transactions are approved by our board of directors. This provision could have the effect of delaying or preventing a change of control, whether or not it is desired by or beneficial to our stockholders. Further, other provisions of Delaware law may also discourage, delay or prevent someone from acquiring us or merging with us.

Risks Related to Information Technology

Significant disruptions of information technology systems or breaches of data security could adversely affect our business.

Our business is increasingly dependent on critical, complex, and interdependent information technology (IT) systems, including Internet-based systems, to support business processes as well as internal and external communications. The size and complexity of our IT systems make us potentially vulnerable to IT system breakdowns, malicious intrusion, and computer viruses, which may result in the impairment of our ability to operate our business effectively.

In addition, our systems are potentially vulnerable to data security breaches-whether by employees or others-which may expose sensitive data to unauthorized persons. Such data security breaches could lead to the loss of trade secrets or other intellectual property, or could lead to the public exposure of personal information (including sensitive personal information) of our employees, clinical trial patients, customers, business partners and others.

Any such disruption or security breach could result in legal proceedings, liability under laws that protect the privacy of personal information, regulatory penalties, disruptions to our operations and collaborations, and damage to our reputation, which could harm our business and results of operations.

Increasing use of social media could give rise to liability, breaches of data security, or reputational damage.

We and our employees are increasingly utilizing social media tools as a means of communication both internally and externally. Despite our efforts to monitor evolving social media communication guidelines and comply with applicable rules, there is risk that the use of social media by us or our employees to communicate about our products or business may cause us to be found in violation of applicable laws and regulations. In addition, our employees may knowingly or inadvertently make use of social media in ways that may not comply with our social media policy or other legal or contractual requirements, which may give rise to liability, lead to the loss of trade secrets or other intellectual property, or result in public exposure of personal information of our employees, clinical trial patients, customers, and others. Furthermore, negative posts or comments about us or our products in social media could seriously damage our reputation, brand image, and goodwill.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our corporate headquarters are located at 2505 Meridian Parkway, Suite 100, Durham, North Carolina 27713 in a facility we lease encompassing approximately 24,862 square feet of office space. The leases for this facility expire in July 2026. We separately lease laboratory space in Durham, North Carolina, encompassing a total of approximately 7,925 square feet. The lease for this laboratory space in Durham expires in July 2026. Through our subsidiary, Oncoceutics, Inc., we lease month to month approximately 489 square feet of combined office space in New York, New York and Philadelphia, Pennsylvania.

We believe that our property and equipment are generally well maintained and in good operating condition.

ITEM 3. LEGAL PROCEEDINGS

None.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

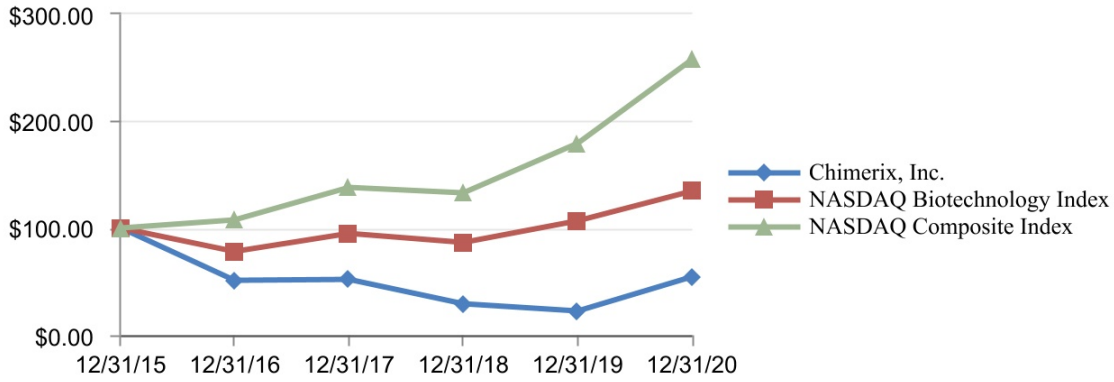
PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Stock Performance Graph[(1)]

The following graph shows a comparison from December 31, 2015 through December 31, 2020 of the cumulative total return for our common stock, the Nasdaq Biotechnology Index (NBI) and the Nasdaq Composite Index (CCMP). The graph assumes an initial investment of $100 on December 31, 2015. The comparisons in the graph below are based upon historical data and are not intended to forecast or be indicative of possible future performance of our common stock or Indexes.

Comparison of Cumulative Total Return*
Among Chimerix, Inc., the Nasdaq Biotechnology Index and the Nasdaq Composite Index



[(1)] This section is not "soliciting material," is not deemed "filed" with the SEC and is not to be incorporated by reference in any of our filings under the Securities Act or the Exchange Act whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.
* Assuming the investment of $100 on 12/31/2015 (and the reinvestment of dividends thereafter) in each of (i) Chimerix, Inc.'s common stock, (ii) the Nasdaq Biotechnology Index and (iii) the Nasdaq Composite Index.

Stockholders

As of February 19, 2021, there were 17 stockholders of record of our common stock, which excludes stockholders whose shares were held in nominee or street name by brokers. The actual number of common stockholders is greater than the number of record holders, and includes stockholders who are beneficial owners, but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

Dividend Policy

We have never declared or paid any cash dividends on our common stock. We currently intend to retain all available funds and any future earnings to support our operations and finance the growth and development of our business. We do not intend to pay cash dividends on our common stock for the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors and will depend upon, among other factors, our results of operations, financial condition, capital requirements, contractual restrictions, business prospects and other factors our board of directors may deem relevant.

Recent Sales of Unregistered Securities

None.

Securities Authorized for Issuance Under Equity Compensation Plans

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

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

We did not purchase any of our securities during the period covered by this Annual Report.

ITEM 6. SELECTED FINANCIAL DATA

The following selected consolidated financial data should be read together with our consolidated financial statements and related notes and "Management's Discussion and Analysis of Financial Condition and Results of Operations" appearing elsewhere in this Annual Report. The selected financial data in this section are not intended to replace our consolidated financial statements and the related notes. Our historical results are not necessarily indicative of the results that may be expected in the future.

We derived the following selected **Consolidated Statement of Operations and Comprehensive Loss Data** for the years ended December 31, 2020, 2019, and 2018 and the selected Consolidated Balance Sheet Data as of December 31, 2020 and 2019 from our audited consolidated financial statements and related notes appearing elsewhere in this Annual Report (in thousands, except share and per share data).

	Years Ended December 31,				
Consolidated Statement of Operations and Comprehensive Loss Data	**2020**	**2019**	**2018**	**2017**	**2016**
Revenues:					
Contract revenue	$ 5,274	$ 7,604	$ 7,216	$ 4,494	$ 5,702
Collaboration and licensing revenue	98	4,915	—	—	—
Total revenues	5,372	12,519	7,216	4,494	5,702
Operating expenses:					
Research and development	36,232	42,288	55,239	49,448	58,647
General and administrative	13,656	21,169	23,582	27,148	25,007
Acquired in-process research and development	—	65,045	—	—	—
Total operating expenses	49,888	128,502	78,821	76,596	83,654
Loss from operations	(44,516)	(115,983)	(71,605)	(72,102)	(77,952)
Other (expense) income:					
Interest income and other, net	994	3,407	2,131	1,118	1,562
Net loss	$ (43,522)	$ (112,576)	$ (69,474)	$ (70,984)	$ (76,390)
Net loss per share, basic and diluted	$ (0.70)	$ (2.03)	$ (1.43)	$ (1.51)	$ (1.65)
Weighted-average shares outstanding, basic and diluted	62,183,947	55,501,973	48,593,435	46,963,430	46,267,064

Consolidated Balance Sheet Data	Years Ended December 31, 2020	2019	2018	2017	2016
Cash and cash equivalents	$ 46,989	$ 16,901	$ 81,106	$ 18,548	$ 51,463
Short-term investments, available-for-sale (1)	31,973	96,574	105,424	132,972	180,558
Working capital	73,125	108,865	176,492	143,337	226,360
Long-term investments (1)	—	—	—	76,731	47,407
Total assets	84,723	119,376	190,714	235,230	286,770
Accumulated deficit	(712,360)	(668,838)	(556,262)	(486,788)	(415,804)
Total stockholders' equity (deficit)	$ 73,376	$ 109,952	$ 177,604	$ 221,810	$ 276,224

(1) Further details of investments is available in "Notes to Consolidated Financial Statements, Note 1. *Fair Value of Financial Instruments"* in Item 8 of this Annual Report.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion and analysis should be read in conjunction with "Selected Financial Data" and our financial statements and related notes included elsewhere in this Annual Report. This discussion and analysis and other parts of this Annual Report contain forward-looking statements based upon current beliefs, plans and expectations that involve risks, uncertainties and assumptions, such as statements regarding our plans, objectives, expectations, intentions and projections. Our actual results and the timing of selected events could differ materially from those anticipated in these forward-looking statements as a result of several factors, including those set forth under "Risk Factors" and elsewhere in this Annual Report. You should carefully read the "Risk Factors" section of this Annual Report to gain an understanding of the important factors that could cause actual results to differ materially from our forward-looking statements. Please also see the section entitled "Forward-Looking Statements."

Overview

Chimerix is a development-stage biopharmaceutical company dedicated to accelerating the advancement of innovative medicines that make a meaningful impact in the lives of patients living with cancer and other serious diseases. Our three most advanced clinical-stage development programs are brincidofovir (BCV), ONC201 and dociparstat sodium (DSTAT). BCV is an antiviral drug candidate developed as a potential medical countermeasure for smallpox and is currently under review for regulatory approval in the United States. ONC201 is currently being investigated in a number of efficacy studies for recurrent H3 K27M-mutant glioma and a confirmatory response rate assessment, potentially sufficient for accelerated approval, is expected later this year. DSTAT is in Phase 3 development as a potential first-line therapy in acute myeloid leukemia (AML) and as a potential treatment for acute lung injury (ALI) in COVID-19 patients.

Recent Developments

BCV Oral Treatment for Smallpox

We completed the rolling NDA submission for BCV tablets and for BCV suspension for the approval of BCV as a medical countermeasure for smallpox. In December 2020, we announced that the FDA had accepted the filing of the NDA. The FDA granted priority review and set a Prescription Drug User Fee Act (PDUFA) date of April 7, 2021. In January 2021, we received notification from the FDA that the PDUFA date for review of BCV as a medical countermeasure for smallpox has been moved to July 7, 2021. Specifically, FDA requested we provide a dose recommendation for infants up to three months of age. In response, we submitted to the FDA the requested modelled analyses, which resulted in the same weight-based dosing recommendation previously proposed for older pediatric patients. The ability to dose across all pediatric age groups with a convenient oral suspension formulation is a unique aspect of the BCV smallpox treatment. The FDA required an additional three months to review this information. We do not expect a delayed FDA action date to impact the timing of the BARDA request for proposal, which is expected this quarter, nor the potential timing of first shipments of BCV to the strategic national stockpile, expected in the second half of this year.

Imipridones and ONC201

Imipridones are a potential new class of selective cancer therapies. These drug candidates target specific G protein-coupled receptors (GPCRs) and mitochondrial caseinolytic protease P (ClpP), in an effort to produce cancer cell death. The imipridone

chemical scaffold provides an opportunity to target GPCRs and ClpP with differential specificity and function. ONC201 selectively targets Dopamine Receptor D2 (DRD2) and ClpP. ONC201 has selectively induced cell death in cancer by binding to and differentially altering activity of DRD2 and ClpP. Clinical trials of ONC201 in glioma patients with the H3 K27M-mutation are underway at several locations in the U.S. Based on discussions with the FDA, we plan to integrate data from ongoing ONC201 trials into a registration cohort with the potential for an NDA submission seeking accelerated approval. A Blinded Independent Central Review analysis of Overall Response Rate (ORR) is expected to take place in 2021 which, if favorable, may form the basis for an NDA submission seeking accelerated of ONC201 in the United States.

ONC206 and ONC212

ONC206 is a DRD2 antagonist and ClpP agonist that demonstrated enhanced non-competitive DRD2 antagonism relative to ONC201, in preclinical studies and additionally showed disruption of DRD2 homodimers. The first-in-human clinical trial of ONC206 for adults with recurrent primary central nervous system tumors is ongoing at the National Institute of Health (NCT04541082). ONC212 is an investigational agonist of the orphan GPCR tumor suppressor GPR132, as well as ClpP. Similar to the potential downstream effects of ONC201 and ONC206, in vitro studies ONC212 has activated the integrated stress response, inhibited Ras signaling and selectively killed tumor cells. Currently ONC212 is in IND-enabling studies.

Dociparstat for the Treatment of Acute Lung Injury (ALI) in COVID-19 Patients

In April 2020, we announced the initiation of a Phase 2/3 study of DSTAT in patients with acute lung injury (ALI) from COVID-19. The study is a randomized, double-blind, placebo-controlled, Phase 2/3 trial to determine the safety and efficacy of DSTAT in adults with severe COVID-19 who are at high risk of respiratory failure. Eligible patients have confirmed COVID-19 and require hospitalization and supplemental oxygen therapy. The primary endpoint of the study is the proportion of patients who survive and do not require mechanical ventilation through day 28. Additional endpoints include time to improvement as assessed by the NIAID ordinal scale, time to hospital discharge, time to resolution of fever, number of ventilator-free days, all-cause mortality, and changes in key biomarkers.

The Phase 2 portion of the study enrolled two cohorts of 12 patients each to confirm the maximum safe dose with reviews by the Data Safety Management Board (DSMB) after completion of each cohort.

Of the 12 patients enrolled in the first cohort, six received a 4mg/kg bolus dose of DSTAT followed by a continuous infusion of 0.25mg/kg/hour and six received placebo. Although in a small number of patients, subject to demographic imbalances, early indications suggest a possible clinical benefit for patients on DSTAT compared to patients on placebo. Chimerix has also completed enrollment of the second cohort of patients randomized 2:1 to receive a 4mg/kg bolus dose of DSTAT followed by a continuous infusion of 0.325mg/kg/hour versus placebo. Based on the safety assessment of the independent safety monitoring committee after these patients have completed treatment, Chimerix will consider advancing to the third cohort of approximately 50 patients at the selected dose. Results from the second cohort are expected to be announced in the second quarter.

The second cohort is fully enrolled and the data will be compiled for review by the DSMB. Following review, the DSMB will recommend a dose for the third cohort which will include approximately 50 additional patients (74 total). A formal analysis of all endpoints, including supportive biomarkers will be performed at the conclusion of the third cohort, completing the Phase 2 portion of the study. Contingent upon positive results, the Phase 3 portion of the study will enroll approximately 450 patients.

Dociparstat for First-Line Acute Myeloid Leukemia (AML)

During 2020, we conducted an end of Phase 2 meeting with the FDA related to our development of DSTAT in AML, which informed the design of the Phase 3 trial. We recently opened clinical trial sites and are ready to begin screening patients for our 570-subject Phase 3 **D**ociparstat in **A**ML with **S**tandard C**h**emotherapy (DASH AML) study of DSTAT for the treatment of AML.

DASH AML is a randomized, double-blinded trial of approximately 570 newly diagnosed AML patients. Patients will receive DSTAT in combination with standard cytarabine plus anthracycline (7+3) induction and cytarabine consolidation chemotherapy or will receive standard of care (7+3) induction and consolidation chemotherapy alone.

In order to supplement the previously reported data from pilot and Phase 2 studies and further evaluate DSTAT's potential mechanism of action, DASH AML includes an early assessment of comparative CR and MRD rates among the first 80 evaluable patients.

The data from the first 80 evaluable patients of the trial are expected to be unblinded, reported publicly, and available for ongoing analysis of later endpoints, unless the independent DMC determines that exceptional pre-specified thresholds have been achieved, in which case the DMC will have the discretion to maintain blinding, which would allow inclusion of these patients in the final analysis.

Public Offering of Common Stock

In January 2021, we entered into an underwriting agreement (the "Underwriting Agreement") with Jefferies LLC and Cowen and Company, LLC, as representatives of the several underwriters named therein (collectively, the "Underwriters"), relating to the issuance and sale of 11,765,000 shares (the "Shares") of the Company's common stock, par value $0.001 per share (the "Common Stock"). The price to the public in this offering is $8.50 per share, and the Underwriters agreed to purchase the Shares pursuant to the Underwriting Agreement at a price of $7.99 per share. Under the terms of the Underwriting Agreement, the Company granted the Underwriters a 30-day option to purchase up to 1,764,750 additional shares of Common Stock at the public offering price which was exercised in full. The net proceeds to the Company from this offering were approximately $107.8 million after deducting underwriting discounts and commissions and estimated offering expenses. The offering closed on January 25, 2021.

Business Development Review

In addition to our transactions with Cantex and Oncoceutics, management is continuing to conduct a review and assessment of potential transaction opportunities with the goal of building our product candidate pipeline, including, but not limited to, licensing, merger or acquisition transactions, issuing or transferring shares of common stock, or the license, purchase or sale of specific assets, in addition to other potential actions aimed at maximizing stockholder value. There can be no assurance that this review will result in the identification or consummation of any additional transaction.

Financial Overview

Revenues

To date, we have not generated any revenue from product sales. All of our revenue to date has been derived from a government grant and contract and the receipt of up-front proceeds under our collaboration and license agreements.

In February 2011, we entered into a contract with BARDA, a U.S. governmental agency that supports the advanced research and development, manufacturing, acquisition, and stockpiling of medical countermeasures. The contract originally consisted of an initial performance period, referred to as the base performance segment, which ended on May 31, 2013, plus up to four extension periods, referred to as option segments, which have all been exercised. The contract is a cost-plus fixed fee development contract. Under the contract as currently in effect, we may receive up to $75.8 million in expense reimbursement and $5.3 million in fees. We are currently performing under the fourth option segment of the contract during which we may receive up to a total of $4.6 million in expense reimbursement and fees. The second and third option segments were completed on August 20, 2020. The fourth option segment is scheduled to end on April 30, 2021. As of December 31, 2020, of the total funding the Company had invoiced an aggregate of $75.5 million with respect to the base performance segment and the four option segments. Under the BARDA contract, we recognized revenue of $5.3 million, $7.6 million, and $7.2 million during the twelve months ended December 31, 2020, 2019, and 2018, respectively.

In September 2019, we entered into a license agreement with SymBio for worldwide rights to develop, manufacture and commercialize BCV in all human indications, excluding the use for treatment of orthopoxviruses, including smallpox. Under the contract, we received a $5.0 million upfront payment in October 2019 and could receive up to an additional $180.0 million in potential regulatory and commercial milestones. Since the license agreement was entered into in September 2019, we have recognized all of the $5.0 million of revenue related to the upfront payment. The revenue from regulatory and commercial milestones and royalties from net sales will be recognized upon occurrence of the triggering events.

In the future, we may generate revenue from a combination of product sales, license fees, milestone payments and royalties from the sales of products developed under licenses of our intellectual property. We expect that any revenue we generate will fluctuate from quarter to quarter as a result of the timing and amount of license fees, milestone and other payments, and the amount and timing of payments that we receive upon the sale of our products, to the extent any are successfully commercialized. If we fail to complete the development of any product candidates in a timely manner or obtain regulatory approval for them, our ability to generate future revenue, and our results of operations and financial position, would be materially adversely affected.

Research and Development Expenses

Since our inception, we have focused our resources on our research and development activities, including conducting preclinical studies and clinical trials, manufacturing development efforts and activities related to regulatory filings for our product candidates. We recognize research and development expenses as they are incurred. Costs for certain development activities are recognized based on an evaluation of the progress to completion of specific tasks using information and data provided to us by our vendors. We cannot determine with certainty the duration and completion costs of the current or future clinical studies of any product candidates. Our research and development expenses consist primarily of:

- fees paid to consultants and contract research organizations (CROs), including in connection with preclinical and clinical trials, and other related clinical trial fees, such as for investigator grants, patient screening, laboratory work, clinical trial database management, clinical trial material management and statistical compilation and analysis;
- salaries and related overhead expenses, which include stock option, restricted stock units and employee stock purchase program compensation and benefits, for personnel in research and development functions;
- payments to third-party manufacturers, which produce, test and package drug substance and drug product (including continued testing of process validation and stability);
- costs related to legal and compliance with regulatory requirements; and
- license fees for and milestone payments related to licensed products and technologies.

The table below summarizes our research and development expenses for the periods indicated (in thousands). Our direct research and development expenses consist primarily of external costs, such as fees paid to investigators, consultants, central laboratories and CROs, in connection with our clinical trials, preclinical development, and payments to third-party manufacturers of drug substance and drug product. We typically use our employee and infrastructure resources across multiple research and development programs.

	Years Ended December 31,		
	2020	**2019**	**2018**
Direct research and development expenses	$ 19,125	$ 22,101	$ 31,325
Research and development personnel costs - excluding stock-based compensation	11,543	12,705	13,488
Research and development personnel costs - stock-based compensation	2,969	4,089	5,343
Indirect research and development expenses	2,595	3,393	5,083
Total research and development expenses	$ 36,232	$ 42,288	$ 55,239

The successful development of product candidates is highly uncertain. At this time, we cannot reasonably estimate the nature, timing or costs of the efforts that will be necessary to complete the development of any product candidates or the period, if any, in which material net cash inflows from any product candidates may commence. This is due to the numerous risks and uncertainties associated with our business, as detailed in Part II, Item IA, “Risk Factors” in this Quarterly Report on Form 10-Q and in our other filings with the SEC.

Dociparstat sodium (DSTAT)

In July of 2019, we acquired DSTAT from Cantex Pharmaceuticals. In connection with the transaction, we recorded in 2019 a total of $65.0 million in expense. This is comprised of a $30.0 million upfront payment, $34.9 million for the fair value of the 10.0 million shares of common stock issued and $0.1 million in transaction costs. As we continue to focus on the development of DSTAT for treatment of AML patients and COVID-19, we expect research and development expense to increase with the ongoing and planned clinical trials. We are currently enrolling a Phase 2/3 study of DSTAT in ALI for patients with COVID-19 and have initiated our Phase 3 DASH AML trial.

Brincidofovir

We are developing BCV for the treatment of smallpox. Under our cost-plus-fixed fee BARDA contract and additional costs we are not seeking reimbursement for from BARDA, we incurred expense in connection with the development of orthopoxvirus animal models, the demonstration of efficacy and pharmacokinetics of BCV in the animal models, the conduct of an open label clinical safety study for subjects with DNA viral infections, the manufacture and process validation of bulk drug substance and BCV 100 mg tablets, and submission of the NDA to the FDA. In addition, we have incurred additional supportive costs for the development of BCV for smallpox that we are not seeking reimbursement for from BARDA.

Historically, the majority of our research and development efforts had been focused on completing our Phase 3 trial of BCV for prevention of CMV in HCT recipients (SUPPRESS), our trial of BCV as a treatment for AdV (AdVise), the Adenovirus after Allogeneic Pediatric Transplantation (AdAPT) study in pediatric HCT recipients and our other clinical and preclinical studies and other work needed to provide sufficient data supporting the safety, tolerability and efficacy of BCV for approval in the United States and equivalent health authority approval outside the United States. In May 2019, we discontinued both the oral and IV development programs of BCV in all indications other than smallpox and the associated clinical trials.

General and Administrative Expenses

General and administrative expenses consist primarily of salaries and related costs for employees in executive, finance, marketing, investor relations, information technology, legal, human resources and administrative support functions, including share-based compensation expenses and benefits. Other significant general and administrative expenses include costs related to commercial readiness efforts, accounting and legal services, costs of various consultants, director and officer liability insurance, occupancy costs and information systems.

Interest Income and Other, Net

Interest income and other, net consists primarily of interest earned on our cash, cash equivalents and short-term investments.

Share-based Compensation

The Financial Accounting Standards Board (FASB) authoritative guidance requires that share-based payment transactions with employees be recognized in the financial statements based on their fair value and recognized as compensation expense over the vesting period. Total consolidated share-based compensation expense of $5.6 million, $9.5 million and $13.1 million was recognized in the years ended December 31, 2020, 2019 and 2018, respectively. The share-based compensation expense recognized included expense for stock options, RSUs and our employee stock purchase plan purchase rights.

We estimate the fair value of our share-based awards to employees and directors using the Black-Scholes pricing model. This estimate is affected by our stock price as well as assumptions including the expected volatility, expected term, risk-free interest rate, expected dividend yield, expected rate of forfeiture and the fair value of the underlying common stock on the date of grant.

For performance-based RSUs, we begin to recognize the expense when it is deemed probable that the performance-based goal will be met. We evaluate the probability of achieving performance-based goals on a quarterly basis.

Critical Accounting Policies and Significant Judgments and Estimates

Our management’s discussion and analysis of financial condition and results of operations is based on our audited consolidated financial statements, which have been prepared in accordance with generally accepted accounting principles in the United States of America (GAAP). The preparation of these consolidated financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses. On an ongoing basis, we evaluate these estimates and judgments. We base our estimates on historical experience and on various assumptions that we believe to be reasonable under the circumstances. These estimates and assumptions form the basis for making judgments about the carrying values of assets and liabilities and the recording of revenues and expenses that are not readily apparent from other sources. Actual results and experiences may differ materially from these estimates. In addition, our reported financial condition and results of operations could vary if new accounting standards are enacted that are applicable to our business.

Our significant accounting policies are described in Note 1 to our audited consolidated financial statements for the year ended December 31, 2020 included in this Annual Report. We believe that our accounting policies relating to revenue recognition, research and development prepaids and accruals, investments and share-based compensation are the most critical to understanding and evaluating our reported financial results. We have identified these policies as critical because they both are important to the presentation of our financial condition and results of operations and require us to make judgments and estimates on matters that are inherently uncertain and may change in future periods. For more information regarding these policies, you should refer to Note 1 to our audited consolidated financial statements included in this Annual Report.

Revenue Recognition

Our revenues generally consist of (i) contract revenue - revenue generated under federal contracts, and (ii) collaboration and licensing revenue - revenue related to non-refundable upfront fees, royalties and milestone payments earned under license

agreements. Revenue is recognized in accordance with the criteria outlined in Accounting Standards Codification (ASC) 606 issued by the Financial Accounting Standards Board (FASB). Following this accounting pronouncement, a five-step approach is applied for recognizing revenue, including (1) identify the contract with a customer; (2) identify the performance obligations in the contract; (3) determine the transaction price; (4) allocate the transaction price to the performance obligations in the contract; and (5) recognize revenue when, or as, the entity satisfies a performance obligation.

Biomedical Advanced Research and Development Authority (BARDA)

In February 2011, we entered into a contract with BARDA for the advanced development of brincidofovir as a medical countermeasure in the event of a smallpox release. Under the contract, we may receive up to $75.8 million in expense reimbursement and $5.3 million in fees over the performance of 1 base segment and 4 option segments. Exercise of each option segment is solely at the discretion of BARDA. We assessed the services in accordance with the authoritative guidance and concluded that there is a potential of 5 separate contracts (1 base segment and 4 option segments) within this agreement, each of which has a single performance obligation. At present, all option segments (1 through 4) have been exercised, as well as the base segment. The transaction price for each segment, based on the transaction price as defined in each segment contract, is allocated to the single performance obligation for each contract. The transaction price is recognized over time by measuring the progress toward complete satisfaction of the performance obligation. For reimbursable expenses, this occurs as qualifying research activities are conducted based on invoices from company vendors. For the fixed fee, the progress toward complete satisfaction is estimated based on the costs incurred to date relative to the total estimated costs per the terms of each contract. We typically invoice BARDA monthly as costs are incurred. Any amounts received in advance of performance are recorded as deferred revenue until earned. The base segment and first option segment were completed prior to adoption of ASC 606.

SymBio Pharmaceuticals

On September 30, 2019, we entered into a license agreement with SymBio Pharmaceuticals Limited (SymBio) under which we granted SymBio exclusive worldwide rights to develop, manufacture and commercialize BCV for all human indications, excluding the prevention and treatment of orthopoxviruses, including smallpox. We assessed the agreement in accordance with the authoritative guidance and concluded that the SymBio contract includes multiple performance obligations. The SymBio contract has one fixed transaction amount of a $5.0 million upfront payment received in October 2019 and several variable transaction amounts, up to $180 million, due to us at certain regulatory and commercial milestones, along with low double-digit percent royalties based on net sales of BCV. All variable transaction amounts are fully constrained, therefore the allocated transaction price is $5.0 million. The majority of the transaction price of the contract has been allocated to the combined performance obligation of the granting of the license to BCV and associated technology transfer which was recognized when the technology transfer was completed in the fourth quarter of 2019. The revenue from regulatory and commercial milestones and royalties from net sales will be recognized upon the occurrence of the triggering events or when those transaction amounts are no longer fully constrained.

Research and Development Prepaids and Accruals

As part of the process of preparing financial statements, we are required to estimate our expenses resulting from our obligation under contracts with vendors and consultants and clinical site agreements in connection with our research and development efforts. The financial terms of these contracts are subject to negotiations which vary contract to contract and may result in payment flows that do not match the periods over which materials or services are provided to us under such contracts.

Our objective is to reflect the appropriate research and development expenses in our financial statements by matching those expenses with the period in which services and efforts are expended. We account for these expenses according to the progress of our research and development efforts. We determine prepaid and accrual estimates through discussion with applicable personnel and outside service providers as to the progress or state of communication of clinical trials, or other services completed. We adjust our rate of research and development expense recognition if actual results differ from our estimates. We make estimates of our prepaid and accrued expenses as of each balance sheet date in its financial statements based on facts and circumstances known at that time. Although we do not expect our estimates to be materially different from amounts actually incurred, our understanding of status and timing of services performed relative to the actual status and timing of services performed may vary and may result in us reporting amounts that are too high or too low for any particular period. Through December 31, 2020, there had been no material adjustments to our prior period estimates of prepaid and accruals for research and development expenses. Our research and development prepaids and accruals are dependent upon the timely and accurate reporting of contract research organizations and other third-party vendors.

Acquired In-Process Research and Development (IPR&D) Expense

We have acquired and may continue to acquire the rights to develop and commercialize new drug candidates. In accordance with Accounting Standards Codification, or ASC, Subtopic 730-10-25, Accounting for Research and Development Costs, the up-front payments to acquire a new drug compound, as well as future milestone payments when paid or payable, are immediately expensed as acquired IPR&D in transactions other than a business combination provided that the drug has not achieved regulatory approval for marketing and, absent obtaining such approval, has no alternative future use. Upon obtaining regulatory approval for marketing, any subsequent milestone payments may be capitalized and amortized over the life of the asset.

Investments

Investments consist primarily of commercial paper, corporate bonds, and U.S. Treasury securities. We invest in high-credit quality investments in accordance with our investment policy which minimizes the probability of loss.

Available-for-sale debt securities are carried at fair value as determined by quoted market prices, with the unrealized gains and losses, net of tax, reported as a separate component of stockholders' deficit. Realized gains and losses are determined using the specific identification method and transactions are recorded on a settlement date basis in interest income (expense) and other, net. Investments with original maturities beyond three months at the date of purchase and which mature on, or less than twelve months from, the balance sheet date are classified as short-term. Investments with a maturity beyond twelve months from the balance sheet date are classified as long-term. We periodically review available-for-sale debt securities for other-than-temporary declines in fair value below the cost basis and whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. We evaluate, among other things, the duration and extent to which the fair value of a security is less than its cost; the financial condition of the issuer and any changes thereto; and our intent to sell, or whether we will more likely than not be required to sell, the security before recovery of our amortized cost basis. Any such declines in value judged to be other-than-temporary on available-for-sale securities are reported in other-than-temporary impairment of investment.

Valuation of Share-Based Compensation

We record the fair value of share-based awards issued as of the grant date as compensation expense. We recognize compensation expense over the requisite service period, which is equal to the vesting period.

Share-based compensation expense includes stock options, RSUs and employee stock purchase plan purchase rights and has been reported in our Consolidated Statements of Operations and Comprehensive Loss as follows (in thousands):

	Years Ended December 31,		
	2020	**2019**	**2018**
Income Statement Classification:			
Research and development expense	$ 2,969	$ 4,089	$ 5,343
General and administrative expense	2,599	5,439	7,731
Total stock-based compensation expense	$ 5,568	$ 9,528	$ 13,074

RSU compensation expense is based on the grant-date fair value of our common stock.

We calculate the fair value of share-based compensation awards using the Black-Scholes option-pricing model. The Black-Scholes option-pricing model requires the use of subjective assumptions, including volatility of our common stock, the expected term of our stock options, the risk-free interest rate for a period that approximates the expected term of our stock options and the fair value of the underlying common stock on the date of grant. In applying these assumptions, we considered the following factors:

- We use historical volatility data to estimate the volatility of our common stock price.
- We use historical exercise data to estimate expected term.
- We determine the risk-free interest rate by reference to implied yields available from U.S. Treasury securities with a remaining term equal to the expected life assumed at the date of grant.
- The assumed dividend yield is based on our expectation of not paying dividends for the foreseeable future.
- We estimate forfeitures based on our historical analysis of actual stock option forfeitures.

The assumptions used in the Black-Scholes option-pricing model for the years ended December 31, 2020, 2019, and 2018 are set forth below:

Stock Options

	Years Ended December 31,		
	2020	2019	2018
Expected volatility	93.24 %	88.77 %	85.83 %
Expected term (in years)	6.0	6.0	5.9
Weighted-average risk-free interest rate	1.24 %	2.42 %	2.52 %
Expected dividend yield	— %	— %	— %
Weighted-average fair value per option	$ 1.78	$ 1.71	$ 3.43

Employee Stock Purchase Plan

	Years Ended December 31,		
	2020	2019	2018
Expected volatility	75.39 %	57.22 %	44.01 %
Expected term (in years)	1.28	1.23	1.23
Weighted-average risk-free interest rate	0.37 %	2.36 %	2.56 %
Expected dividend yield	— %	— %	— %
Weighted-average option value per share	$ 0.93	$ 1.00	$ 1.36

Utilization of Net Operating Loss Carryforwards

At December 31, 2020, we had net operating loss carryforwards for federal and state tax purposes of approximately $551.0 million and $388.5 million, respectively. At December 31, 2019, we had net operating loss carryforwards for federal and state tax purposes of approximately $508.1 million and $384.3 million, respectively. In addition, we had tax credit carryforwards for federal tax purposes of approximately $20.7 million as of December 31, 2020, which begin to expire in 2022. The future utilization of net operating loss and tax credit carryforwards may be limited due to changes in ownership. In general, if we experience a greater than 50 percent aggregate change in ownership of certain significant stockholders or groups over a three-year period (a Section 382 ownership change), utilization of our pre-change net operating loss carryforwards is subject to an annual limitation under Section 382 of the Code (and similar state laws). The annual limitation generally is determined by multiplying the value of our stock at the time of such ownership change (subject to certain adjustments) by the applicable long-term tax-exempt rate. Such limitations may result in expiration of a portion of the pre-change net operating loss carryforwards before utilization and may be substantial. We have determined that a Section 382 ownership change occurred in 2002 and 2007 resulting in limitations of at least $64,000 and $762,000, respectively, of losses incurred prior to the respective ownership change dates. In addition, we have determined that another Section 382 ownership change occurred in 2013 with our initial public offering, our private placements and other transactions that have occurred since 2007, resulting in a limitation of at least $6.7 million of losses incurred prior to the ownership change date. We may also experience ownership changes in the future as a result of subsequent shifts in our stock ownership. Furthermore, under the Tax Act, federal net operating losses incurred in 2018 and in future years may be carried forward indefinitely, but the deductibility of such federal net operating losses is limited. It is uncertain if and to what extent various states will conform to the Tax Act. As a result, if we earn net taxable income, our ability to use our pre-change net operating loss carryforwards to offset United States federal taxable income may be subject to limitations, which could potentially result in increased future tax liability to us.

RESULTS OF OPERATIONS

Comparison of the Years Ended December 31, 2020 and December 31, 2019

The following table summarizes our results of operations for the years ended December 31, 2020 and December 31, 2019, together with the changes in those items in dollars and percentages (in thousands, except percentages):

	Years Ended December 31,		Dollar Change	% Change
	2020	2019	Increase/(Decrease)	
Revenues:				
Contract revenue	$ 5,274	$ 7,604	$ (2,330)	(30.6)%
Licensing revenue	98	4,915	(4,817)	(98.0)
Total revenues	5,372	12,519	(7,147)	(57.1)%
Operating expenses:				
Research and development	36,232	42,288	(6,056)	(14.3)%
General and administrative	13,656	21,169	(7,513)	(35.5)%
Acquired in-process research and development	—	65,045	(65,045)	(100.0)%
Total operating expenses	49,888	128,502	(78,614)	(61.2)%
Loss from operations	(44,516)	(115,983)	71,467	(61.6)%
Other income:				
Interest income and other, net	994	3,407	(2,413)	(70.8)%
Net loss	$ (43,522)	$ (112,576)	$ 69,054	(61.3)%

Revenue

For the year ended December 31, 2020, contract revenue decreased to $5.3 million compared to $7.6 million for the year ended December 31, 2019. The decrease of $2.3 million, or 30.6%, was related to a decrease in reimbursable expenses associated with our contract with BARDA. For the year ended December 31, 2020, license revenue decreased to $0.1 million compared to $4.9 million for the year ended December 31, 2019 due to our licensing agreement with SymBio.

Research and Development Expenses

For the year ended December 31, 2020, our research and development expenses decreased to $36.2 million compared to $42.3 million for the year ended December 31, 2019. The decrease of $6.1 million, or 14.3%, was primarily related to the following:

- a decrease of $9.1 million related to the discontinuation of both the oral and IV BCV development programs and the BCV expanded access programs;
- a decrease of $3.5 million in smallpox program expenses;
- a decrease of $2.7 million related to compensation expenses as headcount was reduced as part of the Company’s restructuring activities in May 2019; offset by
- an increase of $9.5 million in DSTAT research and development expenses, consisting of an increase of $5.4 million in clinical trial initiation activities and $4.1 million to conclude animal studies and to develop and manufacture clinical trial material.

General and Administrative Expenses

For the year ended December 31, 2020, our general and administrative expenses decreased to $13.7 million compared to $21.2 million for the year ended December 31, 2019. The decrease of $7.5 million, or 35.5%, was primarily related to the following:

- a decrease of $5.1 million related to compensation expense as headcount was reduced as part of the Company's restructuring activities in May 2019;
- a decrease of $2.2 million related to business development expenses and to out-license BCV for non-smallpox indications; and
- a decrease of $0.2 million in legal fees, other professional fees and operational expenses.

Acquired In-Process Research and Development

We recorded $65.0 million of acquired in-process research and development expenses for the year ended December 31, 2019, which included $30.0 million for an upfront payment to Cantex, $34.9 million related to the fair value of common stock issued to Cantex, and $0.1 million related to Cantex transaction costs, primarily legal and professional fees. There was no expense related to this for the year ended December 31, 2020.

Interest Income and Other, net

For the year ended December 31, 2020, our interest income and other, net was $1.0 million compared to interest income of $3.4 million for the year ended December 31, 2019. The decrease of $2.4 million was largely attributable to lower interest rates and lower cash and investment balances.

Comparison of the Years ended December 31, 2019 and December 31, 2018

The following table summarizes our results of operations for the years ended December 31, 2019 and December 31, 2018, together with the changes in those items in dollars and percentages (in thousands, except for percentages):

	Years Ended December 31,		Dollar Change	% Change
	2019	2018	Increase/(Decrease)	
Contract revenue	$ 7,604	$ 7,216	$ 388	5.4 %
Licensing revenue	4,915	—	4,915	*
Total revenues	12,519	7,216	5,303	73.5 %
Operating expenses:				
Research and development	42,288	55,239	(12,951)	(23.4)%
General and administrative	21,169	23,582	(2,413)	(10.2)%
Acquired in-process research and development	65,045	—	65,045	*
Total operating expenses	128,502	78,821	49,681	63.0 %
Loss from operations	(115,983)	(71,605)	(44,378)	62.0 %
Other income:				
Interest income and other, net	3,407	2,131	1,276	59.9 %
Net loss	$ (112,576)	$ (69,474)	$ (43,102)	62.0 %

***** Not meaningful or not calculable

Contract Revenue

For the year ended December 31, 2019, contract revenue increased to $7.6 million compared to $7.2 million for the year ended December 31, 2018. The increase of $0.4 million, or 5.4%, was related to an increase in reimbursable expenses associated with our contract with BARDA. License revenue was $4.9 million for the year ended December 31, 2019 due to our licensing agreement with SymBio.

Research and Development Expenses

For the year ended December 31, 2019, our research and development expenses decreased to $42.3 million compared to $55.2 million for the year ended December 31, 2018. The decrease of $13.0 million, or 23.4%, was primarily related to the following:

- a decrease of $8.4 million related to the discontinuation of both the oral and IV BCV development programs and CMX521 for norovirus;
- a decrease of $2.0 million related to compensation expenses as headcount was reduced as part of the Company's restructuring activities in May 2019;
- a decrease of $1.9 million in oral brincidofovir smallpox program expenses; and
- a decrease of $1.5 million in legal fees and operational expenses;

- offset by an increase of $1.2 million in DSTAT research and development expenses to initiate and conduct animal studies and to develop and manufacture clinical trial material.

General and Administrative Expenses

For the year ended December 31, 2019, our general and administrative expenses decreased to $21.2 million compared to $23.6 million for the year ended December 31, 2018. The decrease of $2.4 million, or 10.2%, was primarily related to the following:

- a decrease of $2.9 million in commercial readiness costs;
- a decrease of $0.8 million related to compensation expense; and
- a decrease of $0.6 million in legal fees and operational expenses; offset by
- an increase of $1.9 million related to business development expenses and to out-license BCV for non-smallpox indications.

Acquired In-Process Research and Development

We recorded $65.0 million of acquired in-process research and development expenses for the year ended December 31, 2019, which included $30.0 million for an upfront payment to Cantex, $34.9 million related to the fair value of common stock issued to Cantex, and $0.1 million related to Cantex transaction costs, primarily legal and professional fees.

Interest Income and Other, net

For the year ended December 31, 2019, our interest income and other, net was $3.4 million compared to interest income and other, net of $2.1 million for the year ended December 31, 2018. The increase of $1.3 million was largely attributable to higher interest rates.

LIQUIDITY AND CAPITAL RESOURCES

As of December 31, 2020, we had capital available to fund operations of approximately $79.0 million. Cash in excess of immediate requirements is invested in accordance with our investment policy, primarily with a view to liquidity and capital preservation. We have incurred losses since our inception in 2000 and as of December 31, 2020, we had an accumulated deficit of $712.4 million. We may continue to incur losses for the foreseeable future. The size of our losses will depend, in part, on the rate of future expenditures and our ability to generate revenues.

On November 8, 2017, we entered into an at-the-market (ATM) sales agreement with Cowen and Company, LLC to sell up to $75 million of our common stock under a shelf registration statement filed in November 2017. As of December 31, 2018, we had sold an aggregate of 2.8 million shares of common stock pursuant to the ATM at a weighted average price per share of $4.00 for net offering proceeds of $10.9 million. We did not sell any shares of our common stock subsequent to 2018 and we terminated the ATM sales agreement with Cowen and Company, LLC in July 2020.

On August 10, 2020, we entered into an Open Market Sale Agreement℠ (the Jefferies Sales Agreement) with Jefferies LLC, as agent, pursuant to which we may offer and sell, from time to time through Jefferies, up to $75 million of shares of our common stock. Sales of our common stock made pursuant to the Jefferies Sales Agreement, if any, will be made under our shelf registration statement on Form S-3 (File No. 333-244146), which was declared effective by the SEC on August 17, 2020. We have not sold any shares of our common stock under the Jefferies Sales Agreement.

On January 20, 2021, we entered into an underwriting agreement (the “Underwriting Agreement”) with Jefferies LLC and Cowen and Company, LLC, as representatives of the several underwriters named therein (collectively, the “Underwriters”), relating to the issuance and sale of 11,765,000 shares (the “Shares”) of the Company’s common stock, par value $0.001 per share (the “Common Stock”). The price to the public in this offering was $8.50 per share, and the Underwriters agreed to purchase the Shares from the Company pursuant to the Underwriting Agreement at a price of $7.99 per share. Under the terms of the Underwriting Agreement, the Company granted the Underwriters a 30-day option to purchase up to 1,764,750 additional shares of Common Stock at the public offering price. The net proceeds to the Company from this offering was approximately $107.8 million, as the Underwriters’ option to purchase additional shares was exercised in full, after deducting underwriting discounts and commissions and estimated offering expenses payable by the Company. The offering closed on January 25, 2021.

We cannot assure that adequate funding will be available on terms acceptable to us, if at all. Any additional equity financings will be dilutive to our stockholders and any additional debt may involve operating covenants that may restrict our business. If

adequate funds are not available through these means, we may be required to curtail significantly one or more of our research or development programs, and any launch and other commercialization expenses for any of our products that may receive marketing approval. We cannot assure you that we will successfully develop or commercialize our products under development or that our products, if successfully developed, will generate revenues sufficient to enable us to earn a profit.

We believe that our existing cash, cash equivalents, and investments will enable us to fund our current operating expenses and capital requirements for at least the next 12 months. However, changing circumstances beyond our control may cause us to consume capital more rapidly than we currently anticipate.

Cash Flows

The following table sets forth the significant sources and uses of cash for the periods (in thousands):

	Years Ended December 31,		
Cash sources and uses:	**2020**	**2019**	**2018**
Net cash used in operating activities	$ (36,038)	$ (75,181)	$ (53,725)
Net cash provided by investing activities	64,713	10,631	105,095
Net cash provided by financing activities	1,413	345	11,188
Net increase (decrease) in cash and cash equivalents	$ 30,088	$ (64,205)	$ 62,558

Operating Activities

Net cash used in operating activities of $36.0 million for the year ended December 31, 2020 was primarily the result of our $43.5 million net loss offset by the change in operating asset and liabilities and the add-back of non-cash expenses. The change in operating assets and liabilities includes a decrease in prepaid expenses and other assets of $1.0 million and a decrease of $0.9 million in accounts receivable offset by a decrease in accounts payable and accrued liabilities of $0.2 million. Non-cash expenses included add-backs of $5.6 million for stock based compensation and $0.4 million of depreciation of property and equipment offset by $0.2 million of amortization of discount/premium on investments.

Net cash used in operating activities of $75.2 million for the year ended December 31, 2019 was primarily the result of our $112.6 million net loss and the change in operating assets and liabilities, offset by the add-back of non-cash expenses. The change in operating assets and liabilities includes a decrease in accounts payable and accrued liabilities of $4.3 million, an increase of $0.9 million in accounts receivable and an increase in prepaid expenses and other assets of $0.8 million. Non-cash expenses included add-backs of $34.9 million for the fair value of common stock issued in relation to the Cantex license agreement, $9.5 million for stock-based compensation, $0.6 million of depreciation of property and equipment, $0.3 million for the loss on disposal of assets, offset by $1.8 million of amortization of discount/premium on investments.

Net cash used in operating activities of $53.7 million for the year ended December 31, 2018 was primarily the result of our $69.5 million net loss, offset by the change in operating assets and liabilities and the add-back of non-cash expenses. Non-cash expenses included add-backs of $13.1 million for stock-based compensation, $0.9 million of depreciation of property and equipment, $0.4 million for a loss on the sale of investments, and $0.3 million for a loss on equity investment, offset by $0.9 million of amortization of discount/premium on investments. The change in operating assets and liabilities includes a decrease in prepaid expenses and other assets of $0.6 million and a decrease of $1.4 million in accounts receivable.

Investing Activities

Net cash provided by investing activities of $64.7 million during the year ended December 31, 2020 was primarily the result of maturities and sales of short-term investments, offset by purchases of short-term investments. Net cash provided by investing activities of $10.6 million during the year ended December 31, 2019 was primarily the result of maturities and sales of short-term investments, offset by purchases of short-term. Net cash provided by investing activities of $105.1 million during the year ended December 31, 2018 was primarily the result of maturities and sales of short-term investments, offset by purchases of short-term and long-term investments.

Financing Activities

Net cash provided by financing activities of $1.4 million for the year ended December 31, 2020 was primarily the result of $1.4 million from the exercise of stock options and purchases under the ESPP. Net cash provided by financing activities of $0.3 million for the year ended December 31, 2019 was primarily the result of $0.4 million from the exercise of stock options and

purchases under the ESPP. Net cash provided by financing activities of $11.2 million for the year ended December 31, 2018 was primarily the result of $10.9 million in proceeds from the issuance of common stock, $0.7 million from the exercise of stock options and purchases under the ESPP, offset by $0.4 million in payments of deferred offering costs.

Future Funding Requirements

To date, we have not generated any revenue from product sales. We do not know when, or if, we will generate any revenue from product sales. We do not expect to generate significant revenue from product sales unless and until we obtain regulatory approval of and commercialize brincidofovir or any of our other product candidates. At the same time, we expect our expenses to increase in connection with our ongoing development activities, particularly as we continue the research, development and clinical trials of, and seek regulatory approval for, our product candidates. Furthermore, subject to obtaining regulatory approval of any of our product candidates, we expect to incur significant commercialization expenses for product sales, marketing, manufacturing and distribution. We anticipate that we will need substantial additional funding in connection with our continuing operations. Based upon our current operating plan, we believe that our existing cash, cash equivalents and short-term investments, will enable us to fund our operating expenses and capital requirements for at least the next 12 months. We have based our estimates on assumptions that may prove to be wrong, and we may use our available capital resources sooner than we currently expect. Because of the numerous risks and uncertainties associated with the development and commercialization of our product candidates, we are unable to estimate the amounts of increased capital outlays and operating expenditures necessary to complete the development of our product candidates.

Until such time, if ever, as we can generate substantial revenue from product sales, we expect to finance our cash needs through a combination of equity offerings, debt financings, government or other third-party funding, marketing and distribution arrangements, or other collaborations, strategic alliances or licensing arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of our common stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our common stockholders. 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. If we raise additional funds through government or other third-party funding, marketing and distribution arrangements or other collaborations, strategic alliances or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or to grant licenses on terms that may not be favorable to us.

CONTRACTUAL OBLIGATIONS AND COMMITMENTS

The following table summarizes our contractual obligations at December 31, 2020 (in thousands):

	Total	Less Than 1 Year	1 – 3 Years	3 – 5 Years	More Than 5 Years
Operating leases (1)	$ 3,718	$ 260	$ 2,210	$ 1,248	$ —
SPL Supply Purchase Obligation	$ 3,600	$ 1,200	$ 2,400	$ —	$ —
Total	$ 7,318	$ 1,460	$ 4,610	$ 1,248	$ —

(1) Consists of our corporate headquarters lease encompassing 24,862 square feet of office space that expires in July 2026, which decreases to 21,325 feet in March 2021 as we did not renew the portion of the lease that we subleased out. Additionally, consists of our laboratory lease encompassing a total of approximately 7,925 square feet which is located in Durham, North Carolina and expires in July 2026.

In addition to the amounts set forth in the table above, we have payment obligations under license agreements that are contingent upon future events such as our achievement of specified development, regulatory and commercial milestones. We will be required to make additional payments when certain milestones are achieved and we are obligated to pay royalties based on future product sales. As of December 31, 2020, we were unable to estimate the timing or likelihood of achieving the milestones or making future product sales and, therefore, any related payments are not included in the table above. In connection with the development and commercialization of ONC201 and ONC206, in addition to royalties on product sales, we could be required to pay former Oncoceutics securityholders up to an aggregate of $360.0 million in milestone payments, assuming the achievement of all applicable milestone events under the merger agreement. In connection with the development and commercialization of DSTAT, in addition to royalties on product sales, we could be required to pay Cantex up to an aggregate of $587.5 million in milestone payments, assuming the achievement of all applicable milestone events under the license agreement.

Additionally, we enter into contracts in the normal course of business with CROs for clinical trials and clinical supply manufacturing and with vendors for preclinical research studies and other services and products for operating purposes, which generally provide for termination or cancellation within 30 days of notice, and therefore are not included in the table above. We also have agreements with our executive officers that require the funding of specific payments, if certain events occur, such as a change in control or the termination of employment without cause. These potential payment obligations are not included in the table above.

Off-Balance Sheet Arrangements

During the periods presented, we did not have, nor do we currently have, any off-balance sheet arrangements as defined under SEC rules.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Our primary exposure to market risk is interest income sensitivity, which is affected by changes in the general level of U.S. interest rates. Due to the short-term duration of our investment portfolio and the low risk profile of our investments, an immediate 10.0% change in interest rates would not have a material effect on the fair market value of our portfolio. Accordingly, we would not expect our operating results or cash flows to be affected to any significant degree by the effect of a sudden change in market interest rates on our investment portfolio.

We do not believe that our cash, cash equivalents and available-for-sale investments have significant risk of default or illiquidity. While we believe our cash and cash equivalents and available-for-sale investments do not contain excessive risk, we cannot provide absolute assurance that in the future our investments will not be subject to adverse changes in market value. In addition, we maintain significant amounts of cash and cash equivalents at one or more financial institutions that are in excess of federally insured limits.

Inflation generally affects us by increasing our cost of labor and clinical trial costs. We do not believe that inflation has had a material effect on our results of operations for the years ended December 31, 2020 or 2019.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of Chimerix, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Chimerix, Inc. (the Company) as of December 31, 2020 and 2019, the related consolidated statements of operations and comprehensive loss, stockholders' equity (deficit), and cash flows for each of the three years in the period ended December 31, 2020, 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, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2020, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2020, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 25, 2021 expressed an unqualified opinion thereon.

Basis for Opinion

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of the critical audit matter does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the account or disclosure to which it relates.

Accrued Research and Development Expenses

Description of the Matter	As discussed in Note 1 to the consolidated financial statements, within total accrued liabilities, the Company has recorded $1.4 million of accrued research and development expenses, which includes costs resulting from its obligation under contracts with vendors and consultants and clinical site agreements in connection with its research and development efforts. As the financial terms of these contracts vary by contract and may result in payment flows that do not match the periods over which materials or services are provided, the Company develops estimates to match expenses with the period in which services and efforts are expended. The Company determines the accrual based on discussions with applicable personnel and outside service providers as to the progress or state of clinical trials or other services completed. Auditing the Company's accrued research and development expenses involves judgment because the timing of vendor invoicing differs from the services actually provided.
How We Addressed the Matter in Our Audit	We obtained an understanding, evaluated the design and tested the operating effectiveness of internal controls that addressed the information used in, and the identified risks related to, the Company's process for recording accrued research and development expenses, including controls over management's review of the progress of the research and development activities. To evaluate the accrued research and development expenses, our audit procedures included, among others, inspecting the Company's contracts with the research and development related vendors (including pending change orders) and evaluating the underlying data used in the estimate of the services provided. We also corroborated the progress of research and development related activities through inquiry with the Company's project managers and with information obtained directly from third party vendors, as well as tested invoices received from vendors subsequent to the balance sheet date

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2008.
Raleigh, North Carolina
February 25, 2021

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of Chimerix, Inc.

Opinion on Internal Control Over Financial Reporting

We have audited Chimerix, Inc.'s internal control over financial reporting as of December 31, 2020, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Chimerix, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2020, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of Chimerix, Inc. as of December 31, 2020 and 2019, the related consolidated statements of operations and comprehensive loss, stockholders' equity (deficit), and cash flows for each of the three years in the period ended December 31, 2020, and the related notes and our report dated February 25, 2021 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ Ernst & Young LLP

Raleigh, NC
February 25, 2021

CHIMERIX, INC.
CONSOLIDATED BALANCE SHEETS
(in thousands, except share and per share data)

	December 31,	
	2020	**2019**
ASSETS		
Current assets:		
Cash and cash equivalents	$ 46,989	$ 16,901
Short-term investments, available-for-sale	31,973	96,574
Accounts receivable	340	1,233
Prepaid expenses and other current assets	2,356	3,385
Total current assets	81,658	118,093
Property and equipment, net of accumulated depreciation	214	540
Operating lease right-of-use assets	2,825	709
Other long-term assets	26	34
Total assets	$ 84,723	$ 119,376
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 1,283	$ 2,398
Accrued liabilities	7,250	6,830
Total current liabilities	8,533	9,228
Lease-related obligations	2,814	196
Total liabilities	11,347	9,424
Stockholders’ equity:		
Preferred stock, $0.001 par value, 10,000,000 shares authorized at December 31, 2020 and 2019; no shares issued and outstanding as of December 31, 2020 and 2019	—	—
Common stock, $0.001 par value; 200,000,000 shares authorized at December 31, 2020 and 2019; 62,816,039 and 61,590,013 shares issued and outstanding at December 31, 2020 and 2019, respectively	63	62
Additional paid-in capital	785,673	778,693
Accumulated other comprehensive gain, net	—	35
Accumulated deficit	(712,360)	(668,838)
Total stockholders’ equity	73,376	109,952
Total liabilities and stockholders’ equity	$ 84,723	$ 119,376

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

CHIMERIX, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS
(in thousands, except share and per share data)

	Years Ended December 31,		
	2020	**2019**	**2018**
Revenues:			
Contract revenue	$ 5,274	$ 7,604	$ 7,216
Licensing revenue	98	4,915	—
Total revenues	5,372	12,519	7,216
Operating expenses:			
Research and development	36,232	42,288	55,239
General and administrative	13,656	21,169	23,582
Acquired in-process research and development	—	65,045	—
Total operating expenses	49,888	128,502	78,821
Loss from operations	(44,516)	(115,983)	(71,605)
Other income:			
Interest income and other, net	994	3,407	2,131
Net loss	(43,522)	(112,576)	(69,474)
Other comprehensive loss:			
Unrealized (loss) gain on investments, net	(35)	127	871
Comprehensive loss	$ (43,557)	$ (112,449)	$ (68,603)
Per share information:			
Net loss, basic and diluted	$ (0.70)	$ (2.03)	$ (1.43)
Weighted-average shares outstanding, basic and diluted	62,183,947	55,501,973	48,593,435

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

CHIMERIX, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY (DEFICIT)
(in thousands)

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Gain (Loss)	Accumulated Deficit	Total Stockholders' Equity (Deficit)
	Shares	Amount				
Balance, December 31, 2017	47,505,532	$ 47	$ 709,514	$ (963)	$ (486,788)	$ 221,810
Share-based compensation	—	—	13,073	—	—	13,073
Exercise of stock options	29,262	—	115	—	—	115
Employee stock purchase plan purchases	163,717	—	609	—	—	609
RSU stock issuance	233,050	1	(1)	—	—	—
Issuance of common stock, net of issuance costs	2,803,718	3	10,597	—	—	10,600
Comprehensive loss:						
Unrealized gain on investments, net	—	—	—	871	—	871
Net loss	—	—	—	—	(69,474)	(69,474)
Total comprehensive loss						(68,603)
Balance, December 31, 2018	50,735,279	51	733,907	(92)	(556,262)	177,604
Share-based compensation	—	—	9,528	—	—	9,528
Exercise of stock options	19,284	—	43	—	—	43
Employee stock purchase plan purchases	209,075	—	326	—	—	326
RSU stock issuance	626,375	1	(1)	—	—	—
Issuance of common stock, net of issuance costs	10,000,000	10	34,890	—	—	34,900
Comprehensive loss:						
Unrealized gain on investments, net	—	—	—	127	—	127
Net loss	—	—	—	—	(112,576)	(112,576)
Total comprehensive loss						(112,449)
Balance, December 31, 2019	61,590,013	62	778,693	35	(668,838)	109,952
Share-based compensation	—	—	5,568	—	—	$ 5,568
Exercise of stock options	409,988	1	986	—	—	$ 987
Employee stock purchase plan purchases	337,072	—	426	—	—	$ 426
RSU stock issuance	478,966	—	—	—	—	$ —
Comprehensive loss:						
Unrealized loss on investments, net	—	—	—	(35)	—	$ (35)
Net loss	—	—	—	—	(43,522)	$ (43,522)
Total comprehensive loss						(43,557)
Balance, December 31, 2020	62,816,039	$ 63	$ 785,673	$ —	$ (712,360)	$ 73,376

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

CHIMERIX, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Years Ended December 31,		
	2020	**2019**	**2018**
Cash flows from operating activities:			
Net loss	$ (43,522)	$ (112,576)	$ (69,474)
Adjustments to reconcile net loss to net cash used in operating activities:			
Depreciation of property and equipment	402	564	860
Amortization of discount/premium on investments	(190)	(1,842)	(852)
Share-based compensation	5,568	9,528	13,074
Fair value of common stock issued for license agreement	—	34,900	—
(Gain)/Loss on disposition of assets	(10)	264	5
(Gain)/Loss on sale of investments	(4)	31	378
Unrealized loss on equity investment	—	—	348
Lease-related amortization	(14)	(76)	(59)
Changes in operating assets and liabilities:			
Accounts receivable	893	(903)	1,352
Prepaid expenses and other assets	1,025	(777)	638
Accounts payable and accrued liabilities	(186)	(4,294)	5
Net cash used in operating activities	(36,038)	(75,181)	(53,725)
Cash flows from investing activities:			
Purchases of property and equipment	(58)	(158)	(181)
Purchases of short-term investments	(73,978)	(167,528)	(125,611)
Purchases of long-term investments	—	—	(6,031)
Proceeds from sales of short-term investments	17,287	13,117	111,178
Proceeds from maturities of short-term investments	121,452	165,200	125,740
Proceeds from sale of property and equipment	10	—	—
Net cash provided by investing activities	64,713	10,631	105,095
Cash flows from financing activities:			
Proceeds from exercise of stock options	987	43	115
Proceeds from employee stock purchase plan	426	325	608
Proceeds from issuance of common stock, net of commissions	—	—	10,867
Payments of deferred offering costs	—	(23)	(402)
Net cash provided by financing activities	1,413	345	11,188
Net increase (decrease) in cash and cash equivalents	30,088	(64,205)	62,558
Cash and cash equivalents:			
Beginning of period	16,901	81,106	18,548
End of period	$ 46,989	$ 16,901	$ 81,106
Supplemental disclosure of cash flow information			
Non-cash addition to deferred offering costs	$ —	$ —	$ 22
Non-cash purchases of property and equipment	$ 18	$ —	$ —

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

Note 1. The Business and Summary of Significant Accounting Policies

Description of Business

Chimerix is a development-stage biopharmaceutical company dedicated to accelerating the advancement of innovative medicines that make a meaningful impact in the lives of patients living with cancer and other serious diseases. Our three most advanced clinical-stage development programs are brincidofovir (BCV), ONC201 and dociparstat sodium (DSTAT). BCV is an antiviral drug candidate developed as a potential medical countermeasure for smallpox and is currently under review for regulatory approval in the United States. ONC201 is currently being investigated in a number of efficacy studies for recurrent H3 K27M-mutant glioma and a confirmatory response rate assessment, potentially sufficient for accelerated approval, is expected later this year. DSTAT is in Phase 3 development as a potential first-line therapy in acute myeloid leukemia (AML) and as a potential treatment for acute lung injury (ALI) in COVID-19 patients.

Basis of Presentation

The consolidated financial statements include the accounts of the Company, and its wholly owned subsidiaries. The accompanying consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America (GAAP). The preparation of the Company’s consolidated financial statements requires estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses, and the disclosure of contingent assets and liabilities in the consolidated financial statements and accompanying notes. Although these estimates are based on knowledge of current events and actions the Company may undertake in the future, actual results may ultimately differ from these estimates and assumptions.

Reclassifications

Certain prior period amounts in the accompanying consolidated financial statements have been reclassified to conform to the current year presentation. These reclassifications had no effect on previously reported net income or stockholders' equity (deficit).

Cash and Cash Equivalents

The Company considers any highly liquid instrument with an original maturity of three months or less at acquisition to be a cash equivalent. Cash equivalents consist of money market funds, U.S. Treasury securities, commercial paper, and corporate bonds.

Investments

Investments consist primarily of commercial paper, corporate bonds, and U.S. Treasury securities. The Company invests in high-credit quality investments in accordance with its investment policy which minimizes the probability of loss.

Available-for-sale debt securities are carried at fair value as determined by quoted market prices, with the unrealized gains and losses, net of tax, reported as a separate component of stockholders’ equity. Realized gains and losses are determined using the specific identification method and transactions are recorded on a settlement date basis in interest income and other, net. For the year ended December 31, 2020, approximately $4,000 of realized gains were reclassified from accumulated other comprehensive loss, net in the Consolidated Balance Sheets to interest income and other, net in the Consolidated Statements of Operations and Comprehensive Loss. Investments with original maturities beyond three months at the date of purchase and which mature on, or less than twelve months from, the balance sheet date are classified as short-term. Investments with a maturity beyond twelve months from the balance sheet date are classified as long-term.

The Company periodically reviews available-for-sale debt securities for other-than-temporary declines in fair value below the cost basis and whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. The Company evaluates, among other things, the duration and extent to which the fair value of a security is less than its cost; the financial condition of the issuer and any changes thereto; and the Company’s intent to sell, or whether it will more likely than not be required to sell, the security before recovery of its amortized cost basis. The Company does not intend to sell, and is not likely to be required to sell, the available-for-sale debt securities in an unrealized loss position before recovery

of the amortized cost bases of the debt securities, which may be maturity. Any such declines in value judged to be other-than-temporary on available-for-sale debt securities are reported in other-than-temporary impairment of investment.

Concentration of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk consist of cash, cash equivalents, short-term investments, long-term investments and accounts receivable. The Company is exposed to credit risk, subject to federal deposit insurance, in the event of default by the financial institutions holding its cash and cash equivalents to the extent of amounts recorded on the balance sheets. Accounts receivable represent amounts due from an agency of the federal government.

Accounts Receivable

Accounts receivable at December 31, 2020 and December 31, 2019 consisted of amounts billed under the Company's contract with the Biomedical Advanced Research and Development Authority (BARDA). Receivables under the BARDA contract are recorded as qualifying research activities are conducted and invoices from the Company's vendors are received. The Company carries its accounts receivable at cost less an allowance for doubtful accounts. On a periodic basis, the Company evaluates its accounts receivable and establishes an allowance based on its history of collections and write-offs and the current status of all receivables. The Company does not accrue interest on trade receivables. If accounts become uncollectible, they will be written off through a charge to the allowance for doubtful accounts. The Company has not recorded a charge to allowance for doubtful accounts as management believes all receivables are fully collectible.

Fair Value of Financial Instruments

The carrying amounts of certain financial instruments, including accounts receivable, accounts payable and accrued expenses approximate their fair values due to the short-term nature of such instruments.

For assets and liabilities recorded at fair value, it is the Company's policy to maximize the use of observable inputs and minimize the use of unobservable inputs when developing fair value measurements, in accordance with the fair value hierarchy. Fair value measurements for assets and liabilities where there exists limited or no observable market data are based primarily upon estimates and are often calculated based on the economic and competitive environment, the characteristics of the asset or liability and other factors. Therefore, fair value measurements cannot be determined with precision and may not be realized in an actual sale or immediate settlement of the asset or liability. Additionally, there may be inherent weaknesses in any calculation technique and changes in the underlying assumptions used, including discount rates and estimates of future cash flows, could significantly affect the calculated current or future fair values. The Company utilizes fair value measurements to record fair value adjustments to certain assets and liabilities and to determine fair value disclosures.

The Company groups assets and liabilities at fair value in three levels, based on the markets in which the assets and liabilities are traded and the reliability of the assumptions used to determine fair value. The determination of where an asset or liability falls in the hierarchy requires significant judgment. These levels are:

- *Level 1* — Valuations based on unadjusted quoted prices in active markets for identical assets or liabilities that the Company has the ability to access.
- *Level 2* — Valuations based on quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, and models for which all significant inputs are observable, either directly or indirectly.
- *Level 3* — Valuations based on inputs that are unobservable and significant to the overall fair value measurement.

At December 31, 2020 and December 31, 2019, the Company had cash equivalents, including money market funds, and short-term investments, including U.S. Treasury securities, whose value is based on using quoted market prices. Accordingly, these securities are classified as Level 1.

At December 31, 2020, the Company had short-term investments, including corporate bonds. At December 31, 2019, the Company had short-term investments including commercial paper and corporate bonds. As quoted prices are not available for these securities, they are valued using independent pricing models or other model-based valuation techniques such as the present value of future cash flows, adjusted for the security's credit rating, prepayment assumptions and other factors such as credit loss assumptions. Accordingly, these securities are classified as Level 2.

There was no material re-measurement to fair value of financial assets and liabilities that are not measured at fair value on a recurring basis. For additional information regarding the Company's investments, please refer to Note 2, "Investments."

Below is a table that presents information about certain assets measured at fair value on a recurring basis (in thousands):

	Fair Value Measurements December 31, 2020			
	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash equivalents				
Money market funds	$ 1,503	$ 1,503	$ —	$ —
Total cash equivalents	1,503	1,503	—	—
Short-term investments				
U.S. Treasury securities	28,715	28,715	—	—
Corporate bonds	3,258	—	3,258	—
Total short-term investments	31,973	28,715	3,258	—
Total assets	$ 33,476	$ 30,218	$ 3,258	$ —

	Fair Value Measurements December 31, 2019			
	Total	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash equivalents				
Money market funds	$ 11,854	$ 11,854	$ —	$ —
Total cash equivalents	11,854	11,854	—	—
Short-term investments				
U.S. Treasury securities	22,493	22,493	—	—
Commercial paper	43,119	—	43,119	—
Corporate bonds	30,962	—	30,962	—
Total short-term investments	96,574	22,493	74,081	—
Total assets	$ 108,428	$ 34,347	$ 74,081	$ —

Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets consisted of the following (in thousands):

	December 31,	
	2020	2019
Prepaid research and development expenses	$ 1,167	$ 936
Interest receivable	104	323
Prepaid insurance	354	344
Other prepaid expenses and current assets	731	1,782
Total prepaid expenses and other current assets	$ 2,356	$ 3,385

Property and Equipment

Property and equipment are stated at cost, less accumulated depreciation. Depreciation is determined on a straight-line basis over the estimated useful lives of the assets, which generally range from three to five years. Leasehold improvements are amortized over the shorter of the useful life of the asset or the term of the related lease. Maintenance and repairs are charged against expense as incurred.

Impairment of Property and Equipment

The Company evaluates property and equipment for impairment whenever events or changes in circumstances indicate that the carrying value of an asset may not be recoverable. If the estimated future cash flows (undiscounted and without interest charges) from the use of an asset are less than the carrying value, a write-down would be recorded to reduce the related asset to its estimated fair value. For the twelve months ended December 31, 2020, no such write-downs have occurred. For the twelve months ended December 31, 2019, there were $264,000 of write-downs.

Leases

At the inception of an arrangement, we determine if an arrangement is, or contains, a lease based on the unique facts and circumstances present in that arrangement. Lease classification, recognition, and measurement are then determined at the lease commencement date. For arrangements that contain a lease we (i) identify lease and non-lease components, (ii) determine the consideration in the contract, (iii) determine whether the lease is an operating or financing lease; and (iv) recognize lease right-of-use (ROU) assets and liabilities. Lease liabilities and their corresponding ROU assets are recorded based on the present value of lease payments over the expected lease term. The interest rate implicit in lease contracts is typically not readily determinable and as such, we use our incremental borrowing rate based on the information available at the lease commencement date, which represents an internally developed rate that would be incurred to borrow, on a collateralized basis, over a similar term, an amount equal to the lease payments in a similar economic environment.

Most leases include options to renew and, or, terminate the lease, which can impact the lease term. The exercise of these options is at our discretion and we do not include any of these options within the expected lease term as we are not reasonably certain we will exercise these options.

The current portion of our operating lease liabilities is included in accrued liabilities and the long-term portion is included in lease-related obligations.

Accrued Liabilities

Accrued liabilities consisted of the following (in thousands):

	December 31,	
	2020	**2019**
Accrued compensation	$ 4,473	$ 3,626
Accrued research and development expenses	1,375	1,868
Accrued legal expenses	651	78
Other accrued liabilities	751	1,258
Total accrued liabilities	$ 7,250	$ 6,830

Revenue Recognition

Policy

The Company’s revenues generally consist of (i) contract revenue - revenue generated under federal contracts, and (ii) collaboration and licensing revenue - revenue related to non-refundable upfront fees, royalties and milestone payments earned under license agreements. Revenue is recognized in accordance with the criteria outlined in Accounting Standards Codification (ASC) 606 issued by the Financial Accounting Standards Board (FASB). Following this accounting pronouncement, a five-step approach is applied for recognizing revenue, including (1) identify the contract with a customer; (2) identify the performance obligations in the contract; (3) determine the transaction price; (4) allocate the transaction price to the performance obligations in the contract; and (5) recognize revenue when, or as, the entity satisfies a performance obligation.

Biomedical Advanced Research and Development Authority (BARDA)

In February 2011, the Company entered into a contract with BARDA for the advanced development of brincidofovir as a medical countermeasure in the event of a smallpox release. Under the contract, the Company may receive up to $75.8 million in expense reimbursement and $5.3 million in fees over the performance of 1 base segment and 4 option segments. Exercise of each option segment is solely at the discretion of BARDA. The Company assessed the services in accordance with the authoritative guidance and concluded that there is a potential of 5 separate contracts (1 base segment and four option segments) within this agreement, each of which has a single performance obligation. At present, all option segments (1 through 4) have been exercised, as well as the base segment. The transaction price for each segment, based on the transaction price as defined in each segment contract, is allocated to the single performance obligation for each contract. The transaction price for each segment, based on the transaction price as defined in each segment contract, is allocated to the single performance obligation for each contract. The transaction price is recognized over time by measuring the progress toward complete satisfaction of the performance obligation. For reimbursable expenses, this occurs as qualifying research activities are conducted based on invoices from company vendors. For the fixed fee, the progress toward complete satisfaction is estimated based on the costs incurred to date relative to the total estimated costs per the terms of each contract. The Company typically invoices BARDA monthly as costs are incurred. Any amounts received in advance of performance are recorded as deferred revenue until earned. The base segment and first option segment were completed prior to adoption of ASC 606. The Company is currently performing under the fourth option segment of the contract during which the Company may receive up to a total of $4.6 million in expense reimbursement and fees. The second and third option segments were completed on August 20, 2020. The fourth option segment is scheduled to end on April 30, 2021.

SymBio Pharmaceuticals

On September 30, 2019, the Company entered into a license agreement with SymBio Pharmaceuticals Limited (SymBio) under which the Company granted SymBio exclusive worldwide rights to develop, manufacture and commercialize BCV for all human indications, excluding the prevention and treatment of orthopoxviruses, including smallpox. The Company assessed the agreement in accordance with the authoritative guidance and concluded that the SymBio contract includes multiple performance obligations. The SymBio contract has one fixed transaction amount of a $5.0 million upfront payment received in October 2019 and several variable transaction amounts, up to $180.0 million, due to the Company at certain regulatory and commercial milestones, along with low double-digit percent royalties based on net sales of BCV. All variable transaction amounts are fully constrained, therefore the allocated transaction price is $5.0 million. The majority of the transaction price of the contract has been allocated to the combined performance obligation of the granting of the license to BCV and associated technology transfer which was recognized when the technology transfer was completed in the fourth quarter of 2019. The revenue from regulatory and commercial milestones and royalties from net sales will be recognized upon the occurrence of the triggering events or when those transaction amounts are no longer fully constrained.

Research and Development Prepaids and Accruals

As part of the process of preparing financial statements, the Company is required to estimate its expenses resulting from its obligation under contracts with vendors and consultants and clinical site agreements in connection with its research and development efforts. The financial terms of these contracts are subject to negotiations which vary contract to contract and may result in payment flows that do not match the periods over which materials or services are provided to the Company under such contracts.

The Company’s objective is to reflect the appropriate research and development expenses in its financial statements by matching those expenses with the period in which services and efforts are expended. The Company accounts for these expenses according to the progress of its research and development efforts. The Company determines prepaid and accrual estimates through discussion with applicable personnel and outside service providers as to the progress or state of communication of clinical trials, or other services completed. The Company adjusts its rate of research and development expense recognition if actual results differ from its estimates. The Company makes estimates of its prepaid and accrued expenses as of each balance sheet date in its financial statements based on facts and circumstances known at that time. Although the Company does not expect its estimates to be materially different from amounts actually incurred, its understanding of status and timing of services performed relative to the actual status and timing of services performed may vary and may result in the Company reporting amounts that are too high or too low for any particular period. Through December 31, 2020, there had been no material adjustments to the Company’s prior period estimates of prepaid and accruals for research and development expenses. The Company’s research and development prepaids and accruals are dependent upon the timely and accurate reporting of contract research organizations and other third-party vendors.

Research and Development Expenses

Major components of research and development costs include cash compensation, stock based compensation, pre-clinical studies, clinical trial and related clinical manufacturing, drug development, materials and supplies, legal, regulatory compliance, and fees paid to consultants and other entities that conduct certain research and development activities on the Company's behalf. Research and development costs, including upfront fees and milestones paid to contract research organizations, are expensed as goods are received or services rendered. Costs incurred in connection with clinical trial activities for which the underlying nature of the activities themselves do not directly relate to active research and development, such as costs incurred for market research and focus groups linked to clinical strategy as well as costs to build the Company's brand, are not included in research and development costs but are reflected as general and administrative costs.

Interest Income and Other, Net

Interest income and other, net consists primarily of interest earned on our cash, cash equivalents and short-term investments.

Income Taxes

Deferred tax assets and liabilities are determined based on differences between the financial and tax reporting bases of assets and liabilities and are measured using enacted tax rates and laws that are expected to be in effect when the differences are expected to reverse. Valuation allowances are established when the Company determines that it is more likely than not that some portion of a deferred tax asset will not be realized. The Company has incurred operating losses from April 7, 2000 (inception) through December 31, 2020, and therefore has not recorded any current provision for income taxes.

Additionally, the Company recognizes the tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities based on the technical merits of the position. The tax benefit recognized in the financial statements for a particular tax position is based on the largest benefit that is more likely than not to be realized upon settlement. Accordingly, the Company establishes reserves for uncertain tax positions.

The FASB Staff Q&A, Topic 740, No. 5, Accounting for Global Intangible Low-Taxed Income (GILTI), states that an entity can make an accounting policy election to either recognized deferred taxes for temporary basis differences expected to reverse as GILTI in future years or to provide for the tax expense related to GILTI in the year the tax is incurred as a period expense only. The Company has elected to account for GILTI as a period expense in the year the tax is incurred.

Share-Based Compensation

The Company measures and recognizes compensation expense for all share-based payment awards made to employees and directors, including employee stock options, restricted stock units and the employee stock purchase plan purchase rights, based on estimated fair values. The fair value of employee stock options and employee stock purchase plan purchase rights is estimated on the grant date using the Black-Scholes valuation model. The grant-date fair value for restricted stock units is based upon the market price of the Company's common stock on the date of the grant. The value of the portion of the award that is ultimately expected to vest is recorded as expense over the requisite service periods. For performance-based awards compensation cost is recognized when it is probable that the performance criteria will be met.

The Company estimates forfeitures at the time of grant and revises those estimates in subsequent periods if actual forfeitures differ from its estimates. The Company uses historical data to estimate forfeitures and records share-based compensation expense only for those awards that are expected to vest. To the extent that actual forfeitures differ from the Company's estimates, the difference is recorded as a cumulative adjustment in the period the estimates were revised. For the years ended December 31, 2020, 2019 and 2018, the Company applied a forfeiture rate based on the Company's historical forfeitures.

401(k) Plan

The Company maintains a defined contribution employee retirement plan (401(k) plan). For the years ended December 31, 2020, 2019 and 2018, the Company recognized expenses for matching contributions of $0.3 million, $0.3 million and $0.4 million, respectively.

Basic and Dilutive Net Loss Per Share of Common Stock

Basic net loss per share of common stock is computed by dividing net loss by the weighted-average number of shares of common stock outstanding during the period, excluding the dilutive effects of warrants to purchase common stock, non-vested

restricted stock, stock options, and employee stock purchase plan purchase rights. Diluted net loss per share of common stock is computed by dividing net loss by the sum of the weighted-average number of shares of common stock outstanding during the period plus the potential dilutive effects of warrants to purchase common stock, non-vested restricted stock, stock options, and employee stock purchase plan purchase rights outstanding during the period calculated in accordance with the treasury stock method, but are excluded if their effect is anti-dilutive. Because the impact of these items is anti-dilutive during the periods of net loss, there was no difference between basic and diluted loss per share of common stock at December 31, 2020, 2019 and 2018.

The calculation of weighted-average diluted shares outstanding excludes the dilutive effect of non-vested restricted stock, stock options to purchase common stock, and employee stock purchase plan purchase rights as the impact of such items are anti-dilutive during periods of net loss. Potential common shares excluded from the calculations were 1,162,161, 1,571,356, and 749,110, for the years ended December 31, 2020, 2019 and 2018, respectively.

Segments

The Company operates in only one segment, pharmaceuticals.

Impact of Recently Issued Accounting Standards

In June 2016, the FASB issued ASU 2016-13, *Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*, which amends the impairment model by requiring entities to use a forward-looking approach on expected losses to estimate credit losses on certain financial instruments, including trade receivables and available-for-sale debt securities. The new guidance was originally due to become effective for the Company beginning in the first quarter of 2020, however the FASB in November 2019 issued ASU 2019-10 which moved the effective date for smaller reporting companies to the first quarter of 2023. The Company is currently evaluating the potential impact that this standard may have on its consolidated financial statements.

Note 2. Investments

The following tables summarize the Company's short-term and long-term debt investments (in thousands):

	December 31, 2020			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Corporate bonds	$ 3,256	$ 2	$ —	$ 3,258
U.S. Treasury securities	28,717	1	(3)	28,715
Total investments	$ 31,973	$ 3	$ (3)	$ 31,973

	December 31, 2019			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Corporate bonds	$ 30,952	$ 19	$ (9)	$ 30,962
Commercial paper	43,109	14	(4)	43,119
U.S. Treasury securities	22,478	17	(2)	22,493
Total investments	$ 96,539	$ 50	$ (15)	$ 96,574

The following tables summarize the Company's debt investments with unrealized losses, aggregated by investment type and the length of time that individual investments have been in a continuous unrealized loss position (in thousands, except number of securities):

	December 31, 2020					
	Less than 12 Months		Greater than 12 Months		Total	
	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
U.S. Treasury securities	$ 16,598	$ (3)	$ —	$ —	$ 16,598	$ (3)
Total	$ 16,598	$ (3)	$ —	$ —	$ 16,598	$ (3)
Number of securities with unrealized losses		6		—		6

	December 31, 2019					
	Less than 12 Months		Greater than 12 Months		Total	
	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
Corporate bonds	$ 9,657	$ (9)	$ —	$ —	$ 9,657	$ (9)
Commercial paper	10,147	(4)	—	—	10,147	(4)
U.S. Treasury securities	2,994	(2)	—	—	2,994	(2)
Total	$ 22,798	$ (15)	$ —	$ —	$ 22,798	$ (15)
Number of securities with unrealized losses		9		—		9

The following table summarizes the scheduled maturity for the Company's debt investments at December 31, 2020 (in thousands):

	December 31, 2020
Maturing in one year or less	$ 31,973
Total debt investments	$ 31,973

Note 3. Property and Equipment

Property and equipment, net of accumulated depreciation consisted of the following (in thousands):

	December 31,	
	2020	2019
Lab equipment	$ 2,323	$ 2,329
Leasehold improvements	1,584	1,550
Computer equipment	1,207	1,182
Office furniture and equipment	520	520
Property and equipment	5,634	5,581
Less accumulated depreciation	(5,420)	(5,041)
Property and equipment, net of accumulated depreciation	$ 214	$ 540

Note 4. Commitments and Contingencies

Leases

The Company leases its facilities under long-term operating leases that expire at various dates through 2026. The Company generally has options to renew lease terms on its facilities, which may be exercised at the Company's sole discretion. In addition, certain lease arrangements may be terminated prior to their original expiration date at the Company's discretion. The Company evaluates renewal and termination options at the lease commencement date to determine if it is reasonably certain to

exercise the option and has concluded on all operating leases that it is not reasonably certain that any options will be exercised. The weighted-average remaining lease term for the Company's operating leases as of December 31, 2020 was 5.56 years.

Expense related to leases is recorded on a straight-line basis over the lease term. Lease expense under operating leases, including common area maintenance fees, totaled approximately $745,000 and $724,000, respectively, for the twelve months ended December 31, 2020 and 2019, respectively.

The discount rate implicit within the Company's leases is generally not determinable and therefore the Company determines the discount rate based on its incremental borrowing rate based on the information available at commencement date. As of December 31, 2020, the operating lease liabilities reflect a weighted-average discount rate of 7.91%.

The following table sets forth the operating lease right-of-use assets and liabilities as of December 31, 2020 (in thousands):

Assets		
Operating Lease Right-of-Use Assets	$	2,825
Liabilities		
Operating Lease Short-term Liabilities (recorded within Accrued liabilities)	$	112
Operating Lease Long-term Liabilities (recorded within Lease-related obligations)		2,814
Total Operating Lease Liabilities	$	2,926

Operating lease payments over the remainder of the lease terms are as follows (in thousands):

Years Ending December 31,		**As of December 31, 2020**
2021 (1)	$	260
2022		715
2023		736
2024		759
2025		781
Thereafter		467
Total future minimum rental payments	$	3,718
Less amount of lease payments representing interest		792
Total present value of lease payments	$	2,926

(1) The Company entered into the Ninth Amendment of its lease for the Company's headquarters in Durham, North Carolina, which extended the term of the lease 65 months to July 31, 2026. As part of the amendment, the Company will receive a rent abatement of the first 5 months of the new lease term which begins on March 1, 2021. Additionally, the Ninth Amendment grants the Company a refurbishment allowance, which the Company expects to receive in 2021 after the refurbishment has been completed.

For the twelve months ended December 31, 2020 and 2019, the Company made lease payments of approximately $685,000 and $751,000, respectively, which are included in operating cash flows.

Sublease

The Company subleases 3,537 square feet of its office space under a non-cancelable operating lease that expires February 2021. For the twelve months ended December 31, 2020 and 2019, the Company recognized approximately $71,000 of income in Interest income and other, net on the Consolidated Statement of Operations and Comprehensive Loss. Total future minimum rentals under the non-cancelable operating sublease are presented below (in thousands):

Years Ending December 31,		**Minimum Sublease Rentals**
2021	$	14
Total future minimum sublease rentals	$	14

Significance of Revenue Source

The Company is the recipient of federal research contract funds from BARDA. Periodic audits are required under the grant and contract agreements and certain costs may be questioned as appropriate under the agreements. At December 31, 2020, the Company had recorded a $38,000 provision for potential refundable amounts. At December 31, 2019, no provision for refundable amounts under the agreements had been made.

Note 5. Stockholders' Equity (Deficit)

Common Stock

The Company's common stock consists of 200 million authorized shares at December 31, 2020 and 2019, and 62.8 million and 61.6 million shares issued and outstanding at December 31, 2020 and December 31, 2019, respectively.

Shares Reserved for Future Issuance

The Company has reserved shares of common stock for future issuances as follows:

	December 31,	
	2020	**2019**
For exercise of outstanding common stock options	8,906,271	8,390,304
For delivery upon vesting of outstanding restricted stock units	1,133,049	1,561,237
For future equity awards under the 2013 Equity Incentive Plan	3,342,555	1,855,688
For future purchases under the 2013 Employee Stock Purchase Plan	2,419,213	2,333,750
Total shares of common stock reserved for future issuances	15,801,088	14,140,979

Stock Options

The Company maintains a 2013 Equity Incentive Plan (the 2013 Plan). The 2013 Plan provides for the grant of incentive stock options (ISOs), nonstatutory stock options (NSOs), stock appreciation rights, restricted stock awards, restricted stock unit (RSU) awards, performance-based stock awards, and other forms of equity compensation (collectively, stock awards), all of which may be granted to employees, including officers, non-employee directors and consultants of the Company and its affiliates. Additionally, the 2013 Plan provides for the grant of performance cash awards. ISOs may be granted only to employees. All other awards may be granted to employees, including officers, and to non-employee directors and consultants. The number of shares of common stock reserved for issuance under the 2013 Plan will automatically increase on January 1 of each year, continuing through and including January 1, 2023, by 4.0% of the total number of shares of capital stock outstanding on December 31 of the preceding calendar year, or a lesser number of shares determined by the Company's board of directors.

The Company estimates the fair value of its share-based awards to employees, directors and consultants using the Black-Scholes option-pricing model. The Black-Scholes model requires the input of assumptions, including (a) the expected stock price volatility, (b) the calculation of expected term of the award, (c) the risk-free interest rate and (d) expected dividends. For stock options, the Company uses historical exercise data to estimate the expected life. The risk-free interest rates for the periods within the expected life of the option are based on the U.S. Treasury instrument with a life that is similar to the expected life of the option grant. The Company has never paid, and does not expect to pay, dividends in the foreseeable future.

The following table illustrates the assumptions for the Black-Scholes model used in determining the fair value of the stock options granted:

	Years Ended December 31,		
	2020	2019	2018
Expected volatility	93.24 %	88.77 %	85.83 %
Expected term (in years)	6.0	6.0	5.9
Weighted-average risk-free interest rate	1.24 %	2.42 %	2.52 %
Expected dividend yield	— %	— %	— %
Weighted-average fair value per option	$ 1.78	$ 1.71	$ 3.43

A summary of activity related to the Company's stock options is as follows:

	Number of Options Outstanding	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Life (in Years)	Total Intrinsic Value
Balance, December 31, 2018	6,429,638	$ 12.41	7.37	
Granted	4,029,200	2.31	—	
Exercised	(19,284)	2.21	—	
Forfeited	(2,049,250)	9.26	—	
Balance, December 31, 2019	8,390,304	$ 8.36	7.47	
Granted	3,501,080	2.37	—	
Exercised	(409,988)	2.41	—	
Forfeited	(2,575,125)	11.80	—	
Balance, December 31, 2020	8,906,271	$ 5.28	7.52	$ 15,588
Exercisable at December 31, 2020	4,490,813	$ 8.09	6.31	$ 4,923
Vested or expected to vest at December 31, 2020	8,366,467	$ 5.47	7.43	$ 14,233

As of December 31, 2020, there was approximately $6.4 million of total unrecognized compensation cost related to non-vested stock options granted under the 2013 Plan. That compensation cost is expected to be recognized over a weighted-average period of approximately 2.51 years.

Other information regarding the Company's stock options is as follows (in thousands, except per share data):

	Years Ended December 31,		
	2020	2019	2018
Weighted-average grant-date fair value per share of options granted	$ 1.78	$ 1.71	$ 3.43
Total intrinsic value of options exercised	$ 355	$ 10	$ 31
Total fair value of shares vested	$ 4,188	$ 6,798	$ 11,021

The following table summarizes, at December 31, 2020, by price range: (1) for stock option awards outstanding under the 2013 Plan, the number of stock option awards outstanding, their weighted-average remaining life and their weighted-average exercise price; and (2) for stock option awards exercisable under the 2013 Plan, the number of stock option awards exercisable and their weighted-average exercise price:

	Outstanding			Exercisable	
Exercise Price Range ($)	Number	Weighted-Average Remaining Contractual Life (in years)	Weighted-Average Exercise Price	Number	Weighted-Average Exercise Price
1.37 to 7.57	7,607,451	8.21	$ 2.81	3,191,993	$ 3.35
7.58 to 8.06	684,700	3.72	8.06	684,700	8.06
8.07 to 18.75	103,420	3.07	18.75	103,420	18.75
18.76 to 53.74	510,700	3.17	35.61	510,700	35.61
1.37 to 53.74	8,906,271	7.51	$ 5.28	4,490,813	$ 8.09

In April 2019, the Company granted stock options covering a total of 1,750,000 shares in connection with the hiring of its Chief Executive Officer and Chief Business Officer. These grants were non-qualified stock options, have a 10-year term and will vest over four years, with one-fourth vesting on the one-year anniversary of the grant date and remaining three-fourths vesting over the following three years in equal monthly installments. These stock options are subject to the terms of the 2013 Plan, but were granted outside of the 2013 Plan, as they constituted inducement grants in accordance with Nasdaq Stock Market rules.

Employee Stock Purchase Plan

In February 2013, the Company's board of directors adopted the 2013 Employee Stock Purchase Plan (ESPP), which was subsequently ratified by stockholders and became effective in April 2013. The purpose of the ESPP is to retain the services of new employees and secure the services of new and existing employees while providing incentives for such individuals to exert maximum efforts toward the Company's success and that of its affiliates. The ESPP initially authorized the issuance of 704,225 shares of common stock pursuant to purchase rights granted to the Company's employees or to employees of any of its designated affiliates. The number of shares of common stock reserved for issuance will automatically increase on January 1 of each calendar year, from January 1, 2014 through January 1, 2023 by the least of (a) 1% of the total number of shares of common stock outstanding on December 31 of the preceding calendar year, (b) 422,535 shares, or (c) a number determined by the Company's board of directors that is less than (a) and (b). The ESPP is intended to qualify as an "employee stock purchase plan" within the meaning of Section 423 of the Internal Revenue Code of 1986. The common stock reserved for future issuance under the ESPP was automatically increased by an additional 422,535 shares on January 1, 2019 and 2020, bringing the total number of shares of common stock that may be purchased under the ESPP to 3,071,331 and 3,493,866, respectively.

The Company has reserved a total of 3,493,866 shares of common stock to be purchased under the ESPP, of which 2,419,213 and 2,333,750 shares remained available for purchase at December 31, 2020 and 2019, respectively. Eligible employees may authorize an amount up to 15% of their salary to purchase common stock at the lower of a 15% discount to the beginning price of their offering period or a 15% discount to the ending price of each six-month purchase interval. The ESPP also provides for an automatic reset feature to start participants on a new twenty-four-month participation period in the event that the common stock market value on a purchase date is less than the common stock value on the first day of the twenty-four month offering period. The Company issued 337,072 and 209,075 shares of common stock pursuant to the ESPP for the year ended December 31, 2020 and 2019, respectively. Compensation expense for purchase rights under the ESPP related to the purchase discount and the "look-back" option were determined using a Black-Scholes option pricing model.

The following table illustrates the assumptions for the Black-Scholes model used in determining the fair value of the ESPP purchase rights:

	Years Ended December 31,		
	2020	2019	2018
Expected volatility	75.39 %	57.22 %	44.01 %
Expected term (in years)	1.28	1.23	1.23
Weighted-average risk-free interest rate	0.37 %	2.36 %	2.56 %
Expected dividend yield	— %	— %	— %
Weighted-average option value per share	$ 0.93	$ 1.00	$ 1.36

As of December 31, 2020, the Company had a liability of $0.2 million representing employees' contributions to the ESPP.

Restricted Stock Units

For the years ended December 31, 2020 and 2019, the Company issued RSUs to certain employees and consultants which vest based on service criteria. When vested, the RSU represents the right to be issued the number of shares of the Company's common stock that is equal to the number of RSUs granted. The grant date fair value for RSUs is based upon the market price of the Company's common stock on the date of the grant. The fair value is then amortized to compensation expense over the requisite service period or vesting term. For the years ended December 31, 2020 and 2019, the Company issued 478,966 and 626,375 shares of common stock pursuant to the vesting of RSUs, respectively.

A summary of activity related to the Company's RSUs is as follows:

	Number of Restricted Stock Units Outstanding	Weighted-Average Grant-Date Fair Value
Balance, December 31, 2019	1,561,237	$ 2.80
Granted	215,680	2.20
Share issuance	(478,966)	2.99
Forfeited	(164,902)	2.73
Balance, December 31, 2020	1,133,049	$ 2.61

The total unrecognized compensation cost related to the non-vested RSUs as of December 31, 2020 was $1.9 million and will be recognized over a weighted average period of approximately 2.60 years.

Stock-based Compensation

For awards with only service conditions and graded-vesting features, the Company recognizes compensation expense on a straight-line basis over the requisite service period. Total stock-based compensation expense was as follows (in thousands):

	Years Ended December 31,		
	2020	2019	2018
Income Statement Classification:			
Research and development expense	$ 2,969	$ 4,089	$ 5,343
General and administrative expense	2,599	5,439	7,731
Total stock-based compensation expense	$ 5,568	$ 9,528	$ 13,074

Cash received from exercises under all share-based payment arrangements for 2020, 2019 and 2018 was $1.4 million, $0.4 million and $0.7 million, respectively. There was no actual tax benefit realized for the tax deductions from exercises of the share-based payment arrangements during 2020, 2019 or 2018.

On February 5, 2019, Dr. M. Michelle Berrey, the Company's then President and Chief Executive Officer, resigned. The Company entered into a severance agreement with Dr. Berrey that provides for severance benefits to her in connection with her resignation. Among other benefits, Dr. Berrey received accelerated vesting of her outstanding stock options and RSUs as if she

had continued service for an additional 15-month period. In addition, Dr. Berrey's vested options were modified to extend her exercise period to May 5, 2020. The Company recorded a charge of $1.8 million to compensation expense on the date of her resignation related to the acceleration of vesting and the modifications of her outstanding stock options and RSUs.

In May 2019, related to the Company's reduction in workforce further discussed in Note 8, certain outstanding stock option and RSU grants received accelerated vesting as if the service period of the terminated employee continued for an additional 12-month period. In addition, certain vested options were modified to extend their exercise period for 12 months. The Company recorded a charge of $0.7 million to compensation expense on the date of the reduction in workforce related to the acceleration of vesting and the modifications of the outstanding stock options and RSUs.

At-The-Market Equity Offering

On November 8, 2017, the Company entered into an at-the-market (ATM) sales agreement with Cowen and Company, LLC to sell up to $75 million of the Company's common stock under a shelf registration statement filed in November 2017. As of December 31, 2018, the Company had sold an aggregate of 2.8 million shares of common stock pursuant to the ATM at a weighted average price per share of $4.00 for net offering proceeds of $10.9 million. We did not sell any shares of our common stock subsequent to 2018 and we terminated the ATM sales agreement with Cowen and Company, LLC in July 2020.

On August 10, 2020, we entered into an Open Market Sale Agreement[SM] (the Jefferies Sales Agreement) with Jefferies LLC, as agent, pursuant to which we may offer and sell, from time to time through Jefferies, up to $75 million of shares of our common stock. Sales of our common stock made pursuant to the Jefferies Sales Agreement, if any, will be made under our shelf registration statement on Form S-3 (File No. 333-244146), which was declared effective by the SEC on August 17, 2020. We have not sold any shares of our common stock under the Jefferies Sales Agreement.

Note 6. Income Taxes

No income tax expense or benefit has been recorded for the years ended December 31, 2020, 2019 or 2018. This is due to the establishment of a valuation allowance against the deferred tax assets generated during those periods. At December 31, 2020, the Company has concluded that it is more likely than not that the Company may not realize the benefit of its deferred tax assets due to its history of losses. Accordingly, the net deferred tax assets have been fully reserved.

A reconciliation of the difference between the benefit for income taxes and income taxes at the statutory U.S. federal income tax rate is as follows for the years ended December 31, 2020, 2019, and 2018 (in thousands, except percentages):

	2020		2019		2018	
	Amount	% of Pretax Earnings	Amount	% of Pretax Earnings	Amount	% of Pretax Earnings
Income tax benefit at statutory rate	$ (9,140)	21.0 %	$ (23,641)	21.0 %	$ (14,590)	21.0 %
State income taxes	(138)	0.3 %	(1,596)	1.4 %	(792)	1.1 %
Research and development credits	(1,088)	2.5 %	(1,190)	1.1 %	(1,798)	2.6 %
Foreign rate differential	—	— %	—	— %	2	— %
Permanent items	505	(1.2)%	696	(0.6)%	1,164	(1.7)%
Provision to return adjustments	81	(0.2)%	937	(0.8)%	621	(0.9)%
Effect of change in federal tax rate	—	— %	—	— %	—	— %
Effect of change in state tax rate	1,139	(2.6)%	(117)	0.1 %	151	(0.2)%
Removal of excess tax benefit	—	— %	—	— %	—	— %
Increase in unrecognized tax benefits	272	(0.6)%	298	(0.3)%	450	(0.7)%
Current year forfeitures	4,026	(9.2)%	—	— %	—	— %
Change in valuation allowance	4,343	(10.0)%	24,613	(21.9)%	14,792	(21.2)%
Net benefit	$ —	— %	$ —	— %	$ —	— %

The components of deferred tax assets and liabilities at December 31, 2020 and 2019 were as follows (in thousands):

	December 31,	
	2020	2019
Deferred tax assets:		
Domestic net operating loss carryforwards	$ 123,381	$ 114,292
Research and development expenses	293	419
Capitalized Section 174 expenses	—	24
License fees	12,556	14,176
Research and development credits	15,498	14,682
Capital Loss Carryforwards	403	431
Accrued bonuses	943	751
Share-based compensation	3,541	7,557
Other	961	456
Total gross deferred tax assets	157,576	152,788
Valuation allowance	(156,973)	(152,629)
Total deferred tax assets	603	159
Deferred tax liabilities:		
Right-of-use asset	(603)	(159)
Total deferred tax liabilities	(603)	(159)
Total deferred tax assets and liabilities, net	$ —	$ —

At December 31, 2020, the Company had net operating loss carryforwards for federal and state tax purposes of approximately $551.0 million and $388.5 million, respectively. At December 31, 2019, the Company had net operating loss carryforwards for federal and state tax purposes of approximately $508.1 million and $384.3 million, respectively. Federal losses of $408.0 million begin to expire in 2021 and $143.0 million of the federal losses carryforward indefinitely. The state losses begin to expire in 2021. In addition, the Company has tax credit carryforwards for federal tax purposes of approximately $20.7 million as of December 31, 2020, which begin to expire in 2022. The Company also has capital loss carryforwards for federal tax purposes of $0.4 million, which begin to expire in 2022. The future utilization of net operating loss and tax credit carryforwards may be limited due to changes in ownership. Management has recorded a valuation allowance for all of the deferred tax assets due to the uncertainty of future taxable income.

The Company incorporated a subsidiary in the United Kingdom in 2014. However, the subsidiary had zero activity in 2020 and as such, has no undistributed earnings.

The Company incorporated a subsidiary in Ireland during 2018. However, the subsidiary had no activity during both 2019 and 2020 and as such, has no undistributed earnings.

In general, if the Company experiences a greater than 50% aggregate change in ownership of certain significant stockholders over a three-year period (a Section 382 ownership change), utilization of its pre-change net operating loss carryforwards is subject to an annual limitation under Section 382 of the Internal Revenue Code of 1986, as amended (and similar state laws). The annual limitation generally is determined by multiplying the value of the Company's stock at the time of such ownership change (subject to certain adjustments) by the applicable long-term tax-exempt rate. Such limitations may result in expiration of a portion of the net operating loss carryforwards before utilization and may be substantial. The ability of the Company to use its net operating loss carryforwards may be limited or lost if the Company experiences a Section 382 ownership change in connection with offerings or as a result of future changes in its stock ownership. Losses from a specific period may be subject to multiple limitations and would generally be limited by the lowest of those limitations.

The Company has determined that a Section 382 ownership change occurred in 2007, and as such, losses incurred prior to that date are subject to an annual limitation of at least $762,000. The Company evaluated Section 382 ownership changes subsequent to 2007 through September 30, 2020 and concluded that a Section 382 ownership change occurred in 2013 as a result of the initial public offering. As such, losses incurred prior to that date are subject to an annual limitation of at least $6.7 million.

The Company has determined that there may be a future limitation on the Company's ability to utilize its entire federal R&D credit carryover. Therefore, the Company recognized an uncertain tax benefit associated with the federal R&D credit carryover during the years ended December 31, 2020 and 2019, as follows (in thousands):

Balance at December 31, 2018	$ 3,726
Increases related to 2019	297
Increases related to prior periods	—
Balance at December 31, 2019	4,023
Increases related to 2020	272
Increases related to prior periods	—
Balance at December 31, 2020	$ 4,295

The Company has determined that it had no other material uncertain tax benefits for the year ended December 31, 2020. As of January 1, 2020, due to the carry forward of unutilized net operating losses and research and development credits, the Company is subject to U.S. federal and state income tax examinations for the tax years 2000 through 2020. The Company recognizes accrued interest related to unrecognized tax benefits in interest expense and penalties in operating expense. No amounts were accrued for the payment of interest and penalties at December 31, 2020.

The Tax Cuts and Jobs Act implemented a territorial tax system. Under the territorial tax system, in general, the Company's foreign earnings will no longer be subject to tax in the U.S. As part of the transition to the territorial tax system the Tax Act included a mandatory deemed repatriation of all undistributed foreign earnings that are subject to a U.S. income tax. The Company has determined that the deemed repatriation applicable to the year ended December 31, 2017 does not result in an additional U.S. income tax liability as it has no undistributed foreign earnings.

The Tax Act subjects a US shareholder to tax on global intangible low-taxed income (GILTI) earned by certain foreign subsidiaries. The FASB Staff Q&A, Topic 740, No. 5, Accounting for Global Intangible Low-Taxed Income, states that an entity can make an accounting policy election to either recognized deferred taxes for temporary basis differences expected to reverse as GILTI in future years or to provide for the tax expense related to GILTI in the year the tax is incurred as a period expense only. The Company has elected to account for GILTI in the year the tax is incurred. The Company does not have a GILTI inclusion in 2018, 2019 or 2020; therefore, no GILTI tax has been recorded for the years ended December 31, 2019 and 2020.

The SEC staff issued Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cuts and Jobs Act (SAB 118) which allows the Company to record provisional amounts during a measurement period which is similar to the measurement period used when accounting for business combinations. At December 31, 2017 provisional amounts were recorded related to deferred taxes for stock compensation and the deferred rate change. At December 31, 2018 the measurement period has ended and the Company's accounting related to the Tax Act is complete. The Company did not make any measurement-period adjustments related to the provisional items recorded as of December 31, 2017.

Note 7. Significant Agreements

Biomedical Advanced Research and Development Authority (BARDA)

In February 2011, the Company entered into a contract with BARDA for the advanced development of BCV as a medical countermeasure in the event of a smallpox release. Under the contract, BARDA will reimburse the Company, plus pay a fixed fee, for the research and development of BCV as a broad-spectrum therapeutic antiviral for the treatment of smallpox infections. The contract consists of an initial performance period, referred to as the base performance segment, plus up to four extension periods, referred to as option segments, of which all have been exercised. Under the contract as currently in effect, the Company may receive up to $75.8 million in expense reimbursement and $5.3 million in fees.

The Company is currently performing under the fourth option segment of the contract during which the Company may receive up to a total of $4.6 million in expense reimbursement and fees. The second and third option segments were completed on August 20, 2020. The fourth option segment is scheduled to end on April 30, 2021. Of the $75.8 million in expense reimbursement and $5.3 million in fees that the Company may receive, approximately $78.9 million in expense reimbursement and fees has been funded. As of December 31, 2020, of the total funding the Company had invoiced an aggregate of $75.5 million with respect to the base performance segment and the first four extension periods. For the years ended December 31, 2020, 2019, and 2018, the Company recognized revenue under this contract of $5.3 million, $7.6 million and $7.2 million, respectively.

License and Development Agreement with Cantex Pharmaceuticals, Inc.

On July 26, 2019, the Company entered into a License and Development Agreement with Cantex Pharmaceuticals, Inc. (Cantex) pursuant to which the Company acquired exclusive worldwide rights to develop and commercialize, for any and all uses, a glycosaminoglycan compound known as DSTAT, which is currently being studied for the treatment of acute myeloid leukemia. Under the terms of the license agreement, the Company is responsible for, and bears the future costs of, worldwide development and commercialization of DSTAT. In connection with the transaction, Cantex assigned to the Company all of its rights under its DSTAT supply agreements, including its bulk API agreement with Scientific Protein Laboratories LLC (SPL), pursuant to which SPL will exclusively produce DSTAT for the Company through October 2040.

In consideration for the license rights, the Company made an upfront cash payment of $30.0 million to Cantex and issued to Cantex 10.0 million shares of its common stock. For the twelve months ended December 31, 2019, the Company recognized $65.0 million of acquired in-process research and development expenses for the $30.0 million upfront cash payment, the fair value of the 10.0 million shares of common stock issued to Cantex and $0.1 million of transaction costs. The license agreement obligates the Company to pay Cantex regulatory milestone payments of up to $202.5 million upon receipt of product approvals in the United States, the European Union and Japan, and sales milestone payments of up to $385.0 million upon achievement of specified net sales levels. The Company also agreed to pay Cantex tiered royalties based on percentages of net sales beginning at 10% and not to exceed the high-teens.

SymBio Pharmaceuticals

On September 30, 2019, the Company entered into a license agreement with Symbio for the exclusive worldwide rights to develop, manufacture and commercialize BCV for all human indications, excluding the prevention and treatment of orthopoxviruses, including smallpox. Under the terms of the license agreement, SymBio will be responsible for, and bear the future costs of, worldwide development and commercialization of BCV in the licensed indications. Either party may terminate the license agreement upon the occurrence of a material breach by the other party (subject to standard cure periods), or upon certain events involving the bankruptcy or insolvency of the other party. SymBio may also terminate the license agreement without cause on a country-by-country basis upon ninety days prior notice.

In exchange for the license to SymBio under the Company's BCV rights, the Company received an upfront payment of $5.0 million in October 2019. In addition, the Company is eligible to receive up to $180.0 million in clinical, regulatory and commercial milestones worldwide, as well as low double-digit royalties based on net sales of BCV. Since entering into the license agreement in September 2019, the Company has recognized all of the $5.0 million of revenue related to the upfront payment.

Note 8. Restructuring Costs

In May 2019, the Company made the decision to discontinue the development of oral and IV BCV development programs for the treatment of Adenovirus (AdV) in stem-cell transplant (HCT) patients. The Company’s development efforts with respect to BCV are now focused on the treatment of smallpox. As a result, the Company restructured its operations, which included a reduction in workforce of 43 full-time employees and the accrual of expenses to close-out the clinical trials for the oral and IV development programs of BCV in AdV (study 210, study 211, AdAPT) and other supportive BCV development programs. The Company recorded charges for one-time employee termination benefits of $3.3 million, contract close-out costs of $2.0 million, other BCV development costs of $0.3 million, and losses on disposals of fixed assets of $0.3 million during the twelve months ended December 31, 2019. The $2.0 million of contract close-out costs were recorded through an increase in liabilities of $1.5 million with the remainder recognized through the expensing of prepaid balances. As of December 31, 2019, the Company had a clinical trial accrual balance related to the AdAPT, 210 and 211 trial terminations of $27,000 and other development costs accrual balance of $0.1 million. As of December 31, 2019, the Company had a severance accrual balance of $0.2 million.

The following table summarizes the restructuring charges (in thousands) recorded for the twelve months ended December 31, 2019:

	Employee Termination Benefits	Clinical Trial Close-out Costs	Other Development Costs	Fixed Asset Disposals	Total
Research and development	$ 1,437	$ 2,021	$ 339	$ —	$ 3,797
General and administrative	1,909	—	—	—	1,909
Interest income and other, net	—	—	—	250	250
Total restructuring expenses	$ 3,346	$ 2,021	$ 339	$ 250	$ 5,956

The following table sets forth the accrual activity for employee termination benefits and contract close-out costs (in thousands) for the twelve months ended December 31, 2019. No additional charges are expected to be incurred.

	Employee Termination Benefits	Clinical Trial Close-out Costs	Other Development Costs	Fixed Asset Disposals	Total
Balance at January 1, 2019	$ —	$ —	$ —	$ —	$ —
Accruals	3,335	2,131	315	—	5,781
Revised estimates	11	(621)	24	250	(336)
Payments	(3,163)	(1,483)	(229)	(250)	(5,125)
Balance at December 31, 2019	$ 183	$ 27	$ 110	$ —	$ 320

The following table sets forth the accrual activity for employee termination benefits and contract close-out costs (in thousands) for the twelve months ended December 31, 2020.

	Employee Termination Benefits	Clinical Trial Close-out Costs	Other Development Costs	Total
Balance at December 31, 2019	$ 183	$ 27	$ 110	$ 320
Revised estimates	—	(23)	(10)	(33)
Payments	(183)	(4)	(100)	(287)
Balance at December 31, 2020	$ —	$ —	$ —	$ —

For the twelve months ended December 31, 2020, the revised accrual estimates resulted in a decrease to research and development expenses of $33,000. Additionally, during the twelve ended December 31, 2020, refunds of unused deposits of $1.3 million were received, which were previously recorded in prepaid expenses and other current assets on the Consolidated Balance Sheet.

Note 9. Selected Quarterly Financial Data (Unaudited)

The following financial information reflects all normal recurring adjustments, which are, in the opinion of management, necessary for a fair statement of the results of the interim periods. Summarized quarterly data for 2020 and 2019 are as follows (in thousands, except share and per share data):

	2020 Quarters			
	Fourth	Third	Second	First
Revenue	$ 1,120	$ 1,609	$ 1,402	$ 1,241
Operating loss	(11,757)	(11,560)	(10,286)	(10,913)
Net loss	(11,675)	(11,411)	(10,016)	(10,420)
Net loss per share, basic and diluted	$ (0.19)	$ (0.18)	$ (0.16)	$ (0.17)
Weighted-average shares outstanding, basic and diluted	62,702,181	62,242,456	62,042,778	61,742,035

	2019 Quarters			
	Fourth	Third	Second	First
Revenue	$ 6,767	$ 1,958	$ 1,438	$ 2,356
Operating loss	(3,873)	(74,564)	(18,701)	(18,845)
Net loss	(3,503)	(73,730)	(17,650)	(17,693)
Net loss per share, basic and diluted	$ (0.06)	$ (1.26)	$ (0.35)	$ (0.35)
Weighted-average shares outstanding, basic and diluted	61,385,616	58,457,110	51,130,104	50,887,221

Net loss per share is computed independently for each of the quarters presented. Therefore, the sum of the quarterly per share calculations will not necessarily equal the annual per share calculation. Diluted weighted-average shares outstanding are identical to basic weighted-average shares outstanding and diluted net loss per share is identical to basic net loss per share for all quarters of 2020 and 2019.

Note 10. Subsequent Events

The Company has evaluated subsequent events through the issuance date of these financial statements to ensure that this filing includes appropriate disclosure of events both recognized in the financial statements as of December 31, 2020, and events which occurred subsequently but were not recognized in the financial statements.

On January 7, 2021, the Company, Ocean Merger Sub, Inc., a Delaware corporation and wholly-owned subsidiary of the Company (Merger Sub), Oncoceutics, Inc., a Delaware corporation (Oncoceutics), and Fortis Advisors, LLC solely in its capacity as representative of the securityholders of Oncoceutics (the Securityholders' Representative), entered into an Agreement and Plan of Merger (the Merger Agreement). Concurrently with the execution of the Merger Agreement, Merger Sub merged with and into Oncoceutics (the Merger) whereupon the separate corporate existence of Merger Sub ceased, with Oncoceutics continuing as the surviving corporation of the Merger as a wholly-owned subsidiary of the Company.
As consideration for the merger, the Company (a) paid an upfront cash payment of approximately $25.0 million, (b) issued an aggregate of 8,723,769 shares of the Company's common stock, (c) issued a promissory note to Fortis Advisors, LLC in its capacity as representative of the securityholders of Oncoceutics in the principal amount of $14.0 million (the Seller Note), to be paid in cash, subject to the terms and conditions of the Merger Agreement and the Seller Note, upon the one year anniversary of the closing of the Merger, and (d) agreed to make contingent payments up to an aggregate of $360.0 million based on the achievement of certain development, regulatory and commercialization events as set forth in the Merger Agreement, as well as additional tiered royalty payments based upon future net sales of ONC 201 and ONC 206 products, subject to certain reductions as set forth in the Merger Agreement, and a contingent payment in the event the Company receives any proceeds from the sale of a rare pediatric disease priority review voucher based on Oncoceutics' products. The closing payment may be adjusted after the closing, pursuant to procedures set forth in the Merger Agreement, in connection with the finalization of the cash, transaction expenses, debt and working capital amounts at closing. This transaction will be accounted for as an asset acquisition.

The Merger Agreement contains customary representations, warranties and covenants and indemnification provisions. The Company has certain diligence obligations with respect to further development and commercialization of the Oncoceutics product candidates.

On January 20, 2021, we entered into an underwriting agreement (the "Underwriting Agreement") with Jefferies LLC and Cowen and Company, LLC, as representatives of the several underwriters named therein (collectively, the "Underwriters"), relating to the issuance and sale of 11,765,000 shares (the "Shares") of the Company's common stock, par value $0.001 per share (the "Common Stock"). The price to the public in this offering was $8.50 per share, and the Underwriters agreed to purchase the Shares from the Company pursuant to the Underwriting Agreement at a price of $7.99 per share. Under the terms of the Underwriting Agreement, the Company granted the Underwriters a 30-day option to purchase up to 1,764,750 additional shares of Common Stock at the public offering price. The net proceeds to the Company from this offering was approximately $107.8 million, as the Underwriters' option to purchase additional shares was exercised in full, after deducting underwriting discounts and commissions and estimated offering expenses payable by the Company. The offering closed on January 25, 2021.

ITEM. 9 CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our principal executive officer and principal financial officer, after evaluating the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) of the Securities Exchange Act of 1934, as amended, or Exchange Act) as of December 31, 2020, have concluded that, based on such evaluation, our disclosure controls and procedures were effective to ensure that information required to be disclosed by us in the reports we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the rules and forms of the SEC, and is accumulated and communicated to our management, including our principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f). Our internal control system was designed to provide reasonable assurance to our management and Board of Directors regarding the preparation and fair presentation of published financial statements.

Our internal control over financial reporting includes those policies and procedures that:

i. pertain to the maintenance of records, that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets;
ii. provide reasonable assurance that transactions are recorded as necessary to permit preparations of financial statements in accordance with generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with authorizations of our management and directors; and
iii. provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements.

All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation. In making the assessment of internal controls over financial reporting, our management used the criteria issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in *Internal Control-Integrated Framework* (2013 framework). Based on that assessment and those criteria, management has concluded that our internal control over financial reporting was effective as of December 31, 2020.

Ernst & Young LLP, the independent registered public accounting firm that audited our financial statements included in this Annual Report, has issued an attestation report on the Company's internal control over financial reporting, a copy of which appears in Item 8 of this Annual Report.

Changes in Internal Control Over Financial Reporting

No change in our internal control over financial reporting (as defined in Rules 13a-15(d) and 15d-15(d) under the Exchange Act) occurred during the last fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal

control over financial reporting.

ITEM 9B. OTHER INFORMATION

On February 24, 2021, Edward F. Greissing, Jr., a member of the Board of Directors of Chimerix, Inc. (the "Company"), notified the Company that he does not intend to stand for reelection as a Class II Director at the Company's 2021 annual meeting of stockholders. Mr. Greissing's intention not to stand for reelection was not the result of any dispute or disagreement with the Company or the Company's Board of Directors on any matter relating to the operations, policies or practices of the Company.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item and not set forth below will be set forth in the section headed “Election of Directors” and “Executive Officers” in our Proxy Statement for our 2021 Annual Meeting of Stockholders (Proxy Statement), to be filed with the SEC within 120 days after the end of the fiscal year ended December 31, 2020, and is incorporated herein by reference.

We have adopted a code of ethics for directors, officers (including our principal executive officer, principal financial officer and principal accounting officer) and employees, known as the Code of Business Conduct and Ethics. The Code of Business Conduct and Ethics is available on our website at *http://www.chimerix.com* under the Corporate Governance section of our Investor Relations page. We will promptly disclose on our website (i) the nature of any amendment to the policy that applies to our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions and (ii) the nature of any waiver, including an implicit waiver, from a provision of the policy that is granted to one of these specified individuals that is required to be disclosed pursuant to SEC rules and regulations, the name of such person who is granted the waiver and the date of the waiver.

ITEM 11. EXECUTIVE COMPENSATION

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

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

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

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

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item will be set forth in the section headed “Transactions With Related Persons” in our Proxy Statement and is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item will be set forth in the section headed “Ratification of Selection of Independent Registered Public Accounting Firm” in our Proxy Statement and is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

1. *Financial Statements.* The financial statements and reports of independent registered public accounting firm are filed as part of this Annual Report (see "Index to Consolidated Financial Statements" at Item 8).

2. *Financial Statement Schedules.* No financial statement schedules are included because the information is either provided in the consolidated financial statements, is not required under the instructions or is immaterial, and such schedules, therefore have been omitted.

3. *Exhibits.* The following exhibits have been or are being filed herewith and are numbered in accordance with Item 601 of Regulation S-K:

EXHIBIT INDEX

Exhibit Number	Description of Document
2.1** [33]	Agreement and Plan of Merger, dated January 7, 2021, by and among the Registrant, Oncoceutics, Merger Sub
3.1 [1]	Amended and Restated Certificate of Incorporation of the Registrant.
3.2 [1]	Amended and Restated Bylaws of the Registrant.
4.1 [1]	Form of Common Stock Certificate of the Registrant.
10.1+ [1]	Form of Indemnity Agreement by and between the Registrant and its directors and officers.
10.2+ [1]	Chimerix, Inc. 2002 Equity Incentive Plan and Form of Stock Option Agreement, Notice of Exercise and Form of Stock Option Grant Notice thereunder.
10.3+ [1]	Chimerix, Inc. 2012 Equity Incentive Plan and Form of Stock Option Agreement, Notice of Exercise and Form of Stock Option Grant Notice and Form of Restricted Stock Unit Award Agreement and Form of Restricted Stock Unit Award Grant Notice thereunder.
10.4+[15]	Form of Stock Option Agreement, Notice of Exercise and Form of Stock Option Grant Notice and Form of Restricted Stock Unit Award Agreement and Form of Restricted Stock Unit Award Grant Notice under Chimerix, Inc. 2013 Equity Incentive Plan.
10.5+ [2]	Chimerix, Inc. 2013 Equity Incentive Plan, as amended.
10.6+ [1]	Chimerix, Inc. 2013 Employee Stock Purchase Plan.
10.7+ [29]	Chimerix, Inc. Non-Employee Director Compensation Policy.
10.8+ [24]	Chimerix, Inc. Officer Severance Benefit Plan, as amended.
10.9+ [10]	Directorship Offer Letter to Catherine L. Gilliss dated June 13, 2014.
10.10+ [10]	Directorship Offer Letter to Patrick Machado dated May 30, 2014.
10.11 [1]	Office Lease by and between the Registrant and ACP 2505 Meridian LLC dated September 1, 2007, as amended.
10.12 [5]	Lease Agreement by and between the Registrant and Northwood RTC LLC dated March 10, 2014.
10.13 [4]	Fifth Amendment to Office Lease dated July 2, 2014 by and between the Registrant and AREP Meridian I LLC.
10.14 [8]	Sixth Amendment to Office Lease dated April 28, 2015 by and between the Registrant and IVC Meridian TT O, LLC.
10.15 [15]	Seventh Amendment to Office Lease dated March 10, 2017 by and between the Registrant and IVC Meridian TT O, LLC.
10.16 [16]	Eighth Amendment to Office Lease dated July 13, 2017 by and between the Registrant and IVC Meridian TT O, LLC.
10.17* [1]	Contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.18* [6]	Contract modification No. 14, dated May 30, 2013, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.

10.19* [7]	Contract modification No. 15, dated August 28, 2013, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.20* [7]	Contract modification No. 16, dated December 10, 2013, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.21 [3]	Contract modification No. 17, dated April 14, 2014, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.22 [10]	Contract modification No. 18, dated May 6, 2014, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.23* [4]	Contract modification No. 19, dated August 27, 2014, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.24 [4]	Contract modification No. 20, dated October 27, 2014, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.25* [10]	Contract modification No. 21, dated November 7, 2014, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.26 [10]	Contract modification No. 22, dated December 11, 2014, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.27 [10]	Contract modification No. 23, dated December 22, 2014, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.28 [10]	Contract modification No. 24, dated February 19, 2015, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.29 [8]	Contract modification No. 25, dated March 26, 2015, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.30 [9]	Contract modification No. 26, dated June 18, 2015, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.31 [9]	Contract modification No. 27, dated July 14, 2015, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.32* [31]	Contract modification No. 28, dated September 1, 2015, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.33* [31]	Contract modification No. 29, dated September 11, 2015, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.34* [11]	Contract modification No. 30, dated November 12, 2015, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.35* [12]	Contract modification No. 31, dated April 8, 2016, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.36* [12]	Contract modification No. 32, dated May 5, 2016, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.

10.37* [13]	Contract modification No. 33, dated June 17, 2016, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.38* [14]	Contract modification No. 34, dated August 3, 2016, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.39 [15]	Contract modification No. 35, dated October 21, 2016, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.40 [15]	Contract modification No. 36, dated January 23, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.41 [16]	Contract modification No. 37, dated March 27, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.42 [17]	Contract modification No. 38, dated April 3, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.43 [17]	Contract modification No. 39, dated May 11, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.44 [17]	Contract modification No. 40, dated June 16, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.45 [18]	Contract modification No. 41, dated July 24, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.46 [18]	Contract modification No. 42, dated August 25, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.47 [18]	Contract modification No. 43, dated September 22, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.48 [18]	Contract modification No. 44, dated September 28, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.49 [20]	Contract modification No. 45, dated October 20, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.50 [20]	Contract modification No. 46, dated November 27, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.51* [20]	Contract modification No. 47, dated December 21, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.52 [20]	Contract modification No. 48, dated December 21, 2017, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.53* [20]	Contract modification No. 49, dated February 27, 2018, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.54* [21]	Contract modification No. 50, dated March 20, 2018, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.

10.55* [22]	Contract modification No. 51, dated May 31, 2018, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.56* [22]	Contract modification No. 52, dated July 11, 2018, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.57 [23]	Contract modification No. 53, dated September 6, 2018, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.58 [24]	Contract modification No. 54, dated December 3, 2018, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.59* [24]	Contract modification No. 55, dated January 10, 2019, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.60 [26]	Contract modification No. 56, dated March 5, 2019, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.61** [27]	Contract modification No. 57, dated July 12, 2019, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.62** [29]	Contract modification No. 58, dated December 13, 2019, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.63 [30]	Contract modification No. 59, dated May 11, 2020, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.64** [30]	Contract modification No. 60, dated June 17, 2020, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.65** [30]	Contract modification No. 61, dated July 28, 2020, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.66 [31]	Contract modification No. 62, dated September 11, 2020, to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.67** [31]	Contract modification No. 63, dated September 28, 2020 to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.68	Contract modification No. 64, dated January 26, 2021 to the contract by and between the Registrant and the Biomedical Advanced Research and Development Authority of the United States Department of Health and Human Services dated February 16, 2011, as amended.
10.69 [19]	Sales Agreement, dated November 8, 2017, by and between Chimerix, Inc and Cowen and Company, LLC.
10.70 [20]	First Amendment to Industrial Building Lease dated December 14, 2017 by and between Registrant and CLPF - Research Center, LLC.
10.71+ [25]	Employment Offer Letter to Michael Sherman dated April 2, 2019.
10.72+ [25]	Employment Offer Letter to Michael Andriole dated April 4, 2019.
10.73 [27]	Form of Stock Option Grant Notice, Option Agreement and Notice of Exercise for Inducement Grant Outside of 2013 Equity Incentive Plan.
10.74** [28]	License and Development Agreement, dated July 26, 2019, by and between the Registrant and Cantex Pharmaceuticals, Inc.
10.75** [28]	Supply Agreement, dated October 2, 2015, by and between the Registrant (as successor to Cantex Pharmaceuticals, Inc.) and Scientific Protein Laboratories LLC.
10.76** [28]	License Agreement, dated September 30, 2019, by and between the Registrant and SymBio Pharmaceuticals Limited.

10.77 [30]	Ninth Amendment to Office Lease, dated June 24, 2020, by and between the Registrant and BRI 1875 Meridian, LLC.
10.78** [30]	Second Amendment to Lease Agreement, dated July 30, 2020, by and between the Registrant and CLPF-Research Center, LLC.
10.79** [32]	Amendment to the Supply Agreement, dated December 16, 2020, by and between Chimerix, Inc. and Scientific Protein Laboratories, LLC.
10.80 [33]	Promissory Noted, dated January 7, 2021, by and between the Registrant and Fortis Advisors, LLC, solely in its capacity as Securityholders' Representative.
10.81 [34]	Underwriting Agreement, dated January 20, 2021, by and among the Registrant and Jefferies LLC and Cowen and Company, LLC, as representatives of the several underwriters named therein.
23.1	Consent of Ernst & Young LLP, an Independent Registered Public Accounting Firm.
24.1	Power of Attorney. Reference is made to the signature page hereto.
31.1	Certification of Principal Executive Officer, pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Principal Financial Officer, pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	Certification of Principal Executive Officer, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2	Certification of Principal Financial Officer, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS	XBRL Instance Document.
101.SCH	XBRL Taxonomy Extension Schema Document.
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document.
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document.
101.LAB	XBRL Taxonomy Extension Label Linkbase Document.
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document.
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101).

+	Indicates management contract or compensatory plan.
*	Confidential treatment has been granted with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.
**	Certain confidential information contained in this exhibit, marked by brackets, has been omitted pursuant to Item 601 of Regulation S-K.
(1)	Incorporated by reference to Chimerix, Inc.'s Registration Statement on Form S-1 (No. 333-187145), as amended.
(2)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on June 23, 2014.
(3)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on May 9, 2014.
(4)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on November 7, 2014.
(5)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on March 14, 2014.
(6)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 14, 2013.
(7)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 7, 2014.
(8)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on May 11, 2015.
(9)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 6, 2015.
(10)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 6, 2015.
(11)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on February 29, 2016
(12)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on May 9, 2016.
(13)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 8, 2016.
(14)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on November 7, 2016.
(15)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 2, 2017.
(16)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on May 9, 2017.
(17)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 7, 2017.
(18)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on October 11, 2017.
(19)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on November 8, 2017.
(20)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 1, 2018.
(21)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on May 7, 2018.
(22)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 8, 2018.
(23)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on November 8, 2018.
(24)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 5, 2019.
(25)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on April 10, 2019.

(26)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on May 9, 2019.
(27)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 8, 2019.
(28)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on November 5, 2019.
(29)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on February 25, 2020.
(30)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 10, 2020.
(31)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on November 11, 2020.
(32)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on December 23, 2020.
(33)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on January 13, 2021.
(34)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on January 21, 2021.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized.

Chimerix, Inc.

Date: February 25, 2021 By: /s/ Michael A. Sherman
Michael A. Sherman
President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Michael A. Sherman and Michael T. Andriole, and each of them, his true and lawful attorneys-in-fact, each with full power of substitution, for him in any and all capacities, to sign any amendments to this Annual Report on Form 10-K and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact or their substitute or substitutes may do or cause to be done by virtue hereof.

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

Signature	Title	Date
/s/ Michael A. Sherman Michael A. Sherman	President, Chief Executive Officer and Director (Principal Executive Officer)	February 25, 2021
/s/ Michael T. Andriole Michael T. Andriole	Chief Business and Financial Officer (Principal Financial Officer)	February 25, 2021
/s/ David Jakeman David Jakeman	Executive Director of Finance and Accounting (Principal Accounting Officer)	February 25, 2021
/s/ Martha J. Demski Martha J. Demski	Chair of the Board of Directors	February 25, 2021
/s/ Catherine L. Gilliss Catherine L. Gilliss, PhD, RN, FAAN	Member of the Board of Directors	February 25, 2021
/s/ Edward F. Greissing Jr. Edward F. Greissing Jr.	Member of the Board of Directors	February 25, 2021
/s/ Patrick Machado Patrick Machado	Member of the Board of Directors	February 25, 2021
/s/ Robert J. Meyer Robert J. Meyer, MD	Member of the Board of Directors	February 25, 2021
/s/ Fred A. Middleton Fred A. Middleton	Member of the Board of Directors	February 25, 2021
/s/ Pratik S. Multani Pratik S. Multani, MD	Member of the Board of Directors	February 25, 2021

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 | 9

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(if applicable)*
0064	See Block 16C	N/A.	

6. ISSUED BY	CODE	7. ADMINISTERED BY *(If other than Item 6)*	CODE
ASPR-BARDA	ASPR-BARDA	ASPR-BARDA	ASPR-BARDA02
200 Independence Ave., S.W. Room 640-G Washington DC 20201		330 Independence Ave, SW, Rm G640 Washington DC 20201	

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

CHIMERIX, INC. 1377270
CHIMERIX, INC. 2505 MERIDIAN P
2505 MERIDIAN PKWY STE 340
DURHAM NC 277135246

CODE	FACILITY CODE
1377270	

(x) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED *(SEE ITEM 11)*

x 10A. MODIFICATION OF CONTRACT/ORDER NO. HHSO100201100013C

10B. DATED *(SEE ITEM 13)* 02/16/2011

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended. is not extended
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT
THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(if required)*
N/A.

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (*such as changes in paying office, appropriation date, etc.*) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER (*Specify type of modification and authority*) Bilateral: Mutual Agreement of the Parties.

E. IMPORTANT: Contractor is not. is required to sign this document and return 0 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

Tax ID Number: 33-0903395
DUNS Number: 121785997
A. The purpose of this no cost bilateral modification is to incorporate the following changes into the contract:

1. The FAR Provisions and the FAR Clause that are contained in full text in the attached (7 pages) are hereby incorporated into Contract Number HHSO100201100013C, at no additional cost to the Government.

2. The period of performance of CLIN 0005 under the contract is hereby changed from 17 June 2020 through 15 February 2021 to 17 June 2020 through 30 April 2021, at no additional cost

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*	16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*
MICHAEL ALRUTZ SVP & GENERAL COUNSEL	ETHAN J. MUELLER

15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
/s/ Michael Alrutz *(Signature of person authorized to sign)*	1/26/2021	/s/ Ethan J. Mueller *(Signature of Contracting Officer)*	1/28/2021

NAME OF OFFEROR OR CONTACTOR
CHIMERIX, INC. 1377270

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	to the Government. 3. The total amount and scope of all CLINs that are currently being performed under the contract remain unchanged. This modification does not exercise any unexercised Option CLINs under the contract and does not authorize any performance of efforts under any unexercised Option CLINs under the contract. In addition, the total amount, scope and period of performance of all unexercised Option CLINs under the contract remain unchanged. This modification also confirms that all activities under the base period of performance CLIN 0001 were completed as of 31 May 2013 and confirms that all activities under the Option 1/CLIN 0002 period of performance were completed as of 30 April 2015 and confirms that all activities under the Option 2/CLIN 0003 and CLIN 0004 period of performance were completed as of 20 August 2020. B. This is a no cost bilateral modification. The total amount, scope and all other terms and conditions of Contract Number HHSO100201100013C remain unchanged. Period of Performance: 02/16/2011 to 04/30/2021				

52.204-24 Representation Regarding Certain Telecommunications and Video Surveillance Services or Equipment.

As prescribed in 4.2105(a), insert the following provision:

Representation Regarding Certain Telecommunications and Video Surveillance Services or Equipment (Aug 2020)

The Offeror shall not complete the representation at paragraph (d)(1) of this provision if the Offeror has represented that it "does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument" in the provision at 52.204-26, Covered Telecommunications Equipment or Services—Representation, or in paragraph (v) of the provision at 52.212-3, Offeror Representations and Certifications-Commercial Items.

(a) *Definitions.* As used in this provision—

Backhaul, covered telecommunications equipment or services, critical technology, interconnection arrangements, reasonable inquiry, roaming, and substantial or essential component have the meanings provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) *Prohibition*.

(1) Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. Nothing in the prohibition shall be construed to—

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract or extending or renewing a contract with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. This prohibition applies to the use of covered telecommunications equipment or

services, regardless of whether that use is in performance of work under a Federal contract. Nothing in the prohibition shall be construed to—

(i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(c) *Procedures.* The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(d) *Representation.* The Offeror represents that—

(1) It □ will, will not provide covered telecommunications equipment or services to the Government in the performance of any contract, subcontract or other contractual instrument resulting from this solicitation. The Offeror shall provide the additional disclosure information required at paragraph (e)(1) of this section if the Offeror responds "will" in paragraph (d)(1) of this section; and

(2) After conducting a reasonable inquiry, for purposes of this representation, the Offeror represents that—

It □ does, does not use covered telecommunications equipment or services, or use any equipment, system, or service that uses covered telecommunications equipment or services. The Offeror shall provide the additional disclosure information required at paragraph (e)(2) of this section if the Offeror responds "does" in paragraph (d)(2) of this section.

(e) *Disclosures.*

(1) Disclosure for the representation in paragraph (d)(1) of this provision. If the Offeror has responded "will" in the representation in paragraph (d)(1) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment—

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the original equipment manufacturer (OEM) or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number;

and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(ii) For covered services—

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the Product Service Code (PSC) of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(2) Disclosure for the representation in paragraph (d)(2) of this provision. If the Offeror has responded "does" in the representation in paragraph (d)(2) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment—

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(ii) For covered services—

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the PSC of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant

to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.
(End of provision)

52.204-25 Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

As prescribed in 4.2105(b), insert the following clause:

Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (Aug 2020)

(a) *Definitions.* As used in this clause—

Backhaul means intermediate links between the core network, or backbone network, and the small subnetworks at the edge of the network (*e.g.*, connecting cell phones/towers to the core telephone network). Backhaul can be wireless (e.g., microwave) or wired (*e.g.*, fiber optic, coaxial cable, Ethernet).

Covered foreign country means The People's Republic of China.

Covered telecommunications equipment or services means–

(1) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities);

(2) For the purpose of public safety, security of Government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities);

(3) Telecommunications or video surveillance services provided by such entities or using such equipment; or

(4) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

Critical technology means–

(1) Defense articles or defense services included on the United States Munitions List set forth in the International Traffic in Arms Regulations under subchapter M of chapter I of title 22,

Code of Federal Regulations;

(2) Items included on the Commerce Control List set forth in Supplement No. 1 to part 774 of the Export Administration Regulations under subchapter C of chapter VII of title 15, Code of Federal Regulations, and controlled-

(i) Pursuant to multilateral regimes, including for reasons relating to national security, chemical and biological weapons proliferation, nuclear nonproliferation, or missile technology; or

(ii) For reasons relating to regional stability or surreptitious listening;

(3) Specially designed and prepared nuclear equipment, parts and components, materials, software, and technology covered by part 810 of title 10, Code of Federal Regulations (relating to assistance to foreign atomic energy activities);

(4) Nuclear facilities, equipment, and material covered by part 110 of title 10, Code of Federal Regulations (relating to export and import of nuclear equipment and material);

(5) Select agents and toxins covered by part 331 of title 7, Code of Federal Regulations, part 121 of title 9 of such Code, or part 73 of title 42 of such Code; or

(6) Emerging and foundational technologies controlled pursuant to section 1758 of the Export Control Reform Act of 2018 (50 U.S.C. 4817).

Interconnection arrangements means arrangements governing the physical connection of two or more networks to allow the use of another's network to hand off traffic where it is ultimately delivered (*e.g.*, connection of a customer of telephone provider A to a customer of telephone company B) or sharing data and other information resources.

Reasonable inquiry means an inquiry designed to uncover any information in the entity's possession about the identity of the producer or provider of covered telecommunications equipment or services used by the entity that excludes the need to include an internal or third-party audit.

Roaming means cellular communications services (*e.g.*, voice, video, data) received from a visited network when unable to connect to the facilities of the home network either because signal coverage is too weak or because traffic is too high.

Substantial or essential component means any component necessary for the proper function or performance of a piece of equipment, system, or service.

(b) *Prohibition.*

(1) Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal

Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. The Contractor is prohibited from providing to the Government any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless an exception at paragraph (c) of this clause applies or the covered telecommunication equipment or services are covered by a waiver described in FAR 4.2104.

(2) Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract, or extending or renewing a contract, with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless an exception at paragraph (c) of this clause applies or the covered telecommunication equipment or services are covered by a waiver described in FAR 4.2104. This prohibition applies to the use of covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract.

(c) *Exceptions.* This clause does not prohibit contractors from providing—

(1) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(2) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(d) Reporting requirement.

(1) In the event the Contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the Contractor is notified of such by a subcontractor at any tier or by any other source, the Contractor shall report the information in paragraph (d)(2) of this clause to the Contracting Officer, unless elsewhere in this contract are established procedures for reporting the information; in the case of the Department of Defense, the Contractor shall report to the website at https://dibnet.dod.mil. For indefinite delivery contracts, the Contractor shall report to the Contracting Officer for the indefinite delivery contract and the Contracting Officer(s) for any affected order or, in the case of the Department of Defense, identify both the indefinite delivery contract and any affected orders in the report provided at https://dibnet.dod.mil.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause

(i) Within one business day from the date of such identification or notification: the contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(ii) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: any further available information about mitigation actions undertaken or recommended. In addition, the Contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) *Subcontracts.* The Contractor shall insert the substance of this clause, including this paragraph (e) and excluding paragraph (b)(2), in all subcontracts and other contractual instruments, including subcontracts for the acquisition of commercial items.

(End of clause)

52.204-26 Covered Telecommunications Equipment or Services-Representation.

As prescribed in 4.2105(c), insert the following provision:

Covered Telecommunications Equipment or Services-Representation (Dec 2019)

(a) *Definitions.* As used in this provision, "covered telecommunications equipment or services" has the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) *Procedures.* The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (https://www.sam.gov) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(c) *Representation.* The Offeror represents that it □ does, does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(End of provision)

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the following Registration Statements:

1. Registration Statement (Form S-8 No. 333-187860) pertaining to the 2002 Equity Incentive Plan, 2012 Equity Incentive Plan, 2013 Equity Incentive Plan and 2013 Employee Stock Purchase Plan of Chimerix, Inc.,

2. Registration Statement (Form S-8 Nos. 333-194408, 333-202582, 333-209802, 333-216396, 333-223344, 333-230071, 333-233115, and 333-236610) pertaining to the 2013 Equity Incentive Plan and 2013 Employee Stock Purchase Plan of Chimerix, Inc., and

3. Registration Statement (Form S-3 No. 333-244146) of Chimerix, Inc.;

of our reports dated February 25, 2021 with respect to the consolidated financial statements of Chimerix, Inc. and the effectiveness of internal control over financial reporting of Chimerix, Inc. included in this Annual Report (Form 10-K) of Chimerix, Inc. for the year ended December 31, 2020.

/s/ Ernst & Young LLP

Raleigh, North Carolina
February 25, 2021

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Michael A. Sherman, certify that:

1. I have reviewed this Annual Report on Form 10-K for the fiscal year ended December 31, 2020 of Chimerix, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2021

/s/ Michael A. Sherman
Michael A. Sherman
President & Chief Executive Officer

Exhibit 31.2

CERTIFICATION OF THE PRINCIPAL FINANCIAL OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Michael T. Andriole, certify that:

1. I have reviewed this Annual Report on Form 10-K for the fiscal year ended December 31, 2020 of Chimerix, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2021

/s/ Michael T. Andriole

Michael T. Andriole
Chief Business and Financial Officer

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K of Chimerix, Inc. (the "Company") for the period ended December 31, 2020, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Michael A. Sherman, as Principal Executive Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

1. the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 25, 2021

/s/ Michael A. Sherman
Michael A. Sherman
President & Chief Executive Officer

The foregoing certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. § 1350, and is not being filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and is not to be incorporated by reference into any filing of the Company, whether made before or after the date hereof, regardless of any general incorporation language in such filing. A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

Exhibit 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K of Chimerix, Inc. (the "Company") for the period ended December 31, 2020, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Michael T. Andriole, as Principal Financial Officer of the Company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

1. the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 25, 2021

/s/ Michael T. Andriole
Michael T. Andriole
Chief Business and Financial Officer

The foregoing certification is being furnished solely to accompany the Report pursuant to 18 U.S.C. § 1350, and is not being filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and is not to be incorporated by reference into any filing of the Company, whether made before or after the date hereof, regardless of any general incorporation language in such filing. A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.