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, 2022
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 ☐ No ☒

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

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

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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 ☐	Accelerated filer ☐
Non-accelerated filer ☒	Smaller reporting company ☒
	Emerging growth company ☐

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

Indicate by check mark whether the registrant 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. ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

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 ☒

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, 2022 was $111,186,204.

The number of outstanding shares of the registrant’s common stock, par value $0.001 per share, as of February 24, 2023 was 88,273,567.

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, 2022 are incorporated by reference into Part III of this report……	III

CHIMERIX, INC.
FORM 10-K
For the Fiscal Year Ended December 31, 2022
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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, requirements, including the need to develop a companion diagnostic, limitations, and/or warnings in the label of an approved product candidate;
- our ability to obtain funding for our operations;
- our ability to leverage external capital to develop our early-stage pipeline of product candidates;
- the election of the U.S. government to exercise future procurement options for TEMBEXA®;
- the potential for royalty and milestone revenue from our strategic collaborations;
- 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;
- our ability to enter into transactions to build our product candidate pipeline; 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 anticipate that we will continue to incur significant losses for the foreseeable future, and we may never achieve or maintain profitability.
- All of our product candidates are still under clinical development and may not obtain regulatory approval or be successfully commercialized.
- We may be unable to obtain, or may be delayed in obtaining, regulatory approval for our clinical candidates, including our most advanced clinical candidate, ONC201.
- 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, and even if we generate future revenues, they may not be sufficient to lead to profitability.

- If we obtain regulatory approval for any of our product candidates, including ONC201, 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 drug supplies 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 ONC201, and any disruption in the chain of supply for either of these product candidates may cause delays in their development and commercialization.
- We routinely evaluate 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.
- The anticipated benefits of the sale of our TEMBEXA assets to Emergent Biodefense Operations Lansing LLC, (Emergent) may not be realized fully or at all or may take longer to realize than expected. Our ability to receive future contingent consideration from the sale depends on, among other things, Emergent's ability to successfully develop and commercialize TEMBEXA.
- 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.

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 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 (Chimerix, we, our, us or the Company) is a biopharmaceutical company whose mission it is to develop medicines that meaningfully improve and extend the lives of patients facing deadly diseases. The Company is focused on developing imipridones as a potential new class of selective cancer therapies. The most advanced imipridone is ONC201 which is in clinical-stage development for H3 K27M-mutant glioma as its lead indication. In addition, imipridone ONC206 is currently in dose escalating clinical trials.

1 Malignant glioma
2 Adult recurrent H3 K27M-mutant high-grade glioma
3 H3 K27M-mutant glioma
4. Central Nervous System

Imipridones and ONC201 (dordaviprone)

Imipridones are a potential new class of selective cancer therapies. These drug candidates bind specifically with G protein-coupled receptors (GPCRs) and mitochondrial caseinolytic protease P (ClpP), which may result in 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 other diseases.

ONC201 (International Nonproprietary Name (INN): dordaviprone) binds with specificity to Dopamine Receptor D2 (DRD2) and ClpP. ONC201 has been shown to selectively induce cell death in cancer cells by binding to and differentially altering activity of DRD2 and ClpP.

ONC201 Development Program

Following recent interactions with FDA, we believe the best path to approval for ONC201 is successful execution of the Phase 3 ACTION study. Interim data is expected in early 2025, and final data in 2026.

Phase 3 ACTION Study of ONC201

In November 2022, Chimerix announced the launch of its Phase 3 ACTION study at the annual Society for Neuro-Oncology (SNO) conference. The ACTION trial enrolls patients shortly after they have completed front-line radiation therapy that is the standard of care for glioma. The study is designed to enroll 450 patients randomized 1:1:1 to receive ONC201 at one of two dosing frequencies or placebo. Participants will be randomized to receive either: (i) 625mg of ONC201 once per week (the Phase 2 dosing regimen), (ii) 625mg twice per week on two consecutive days or (iii) placebo. The study is open to pediatric and adult patients >10kg body weight and the dose will be scaled by body weight for patients weighing less than 52.5kg. Primary endpoints include Overall Survival (OS) and progression free survival (PFS). OS will be assessed for efficacy at three alpha-allocated timepoints consisting of two interim assessments by the Independent Data Monitoring Committee (IDMC) at 164 events and 246 events, respectively, and a final assessment at 327 events. The final PFS analysis will be performed after 286 events, with progression assessed using response assessment in neuro-oncology-high grade glioma (RANO HGG) and response assessment in neuro-oncology-low grade glioma (RANO-LGG) criteria by blinded independent central review (BICR). Secondary endpoints include corticosteroid response, performance status response, change from baseline in quality of life

(QoL) assessments and change from baseline in neurologic function as assessed by the Neurologic Assessment in Neuro-Oncology (NANO) scale.

Future Regulatory Interactions

The Company's plan is to initiate a submission to regulators for approval upon a positive overall survival analysis at either of the interim or the final overall survival analyses. The first submission for marketing authorization will likely be initiated in the US with submissions outside the US to follow. In addition, in the event the result of the progression free survival analysis is positive, we would discuss the potential for submission and approval of ONC201 with the regulatory authorities based on this data. The Company plans to engage the US FDA on the need for a companion diagnostic for ONC201 as early as this year.

2022 Society for Neuro-Oncology (SNO) Conference

The SNO conference featured two external presentations that reported longer survival for patients with glioma who received ONC201 compared to patients with glioma who received alternative therapies. One of these presentations, from an academic group led by researchers at the University of Michigan, examined clinical trials and institutional experiences in the United States and Europe for patients who received ONC201. These researchers concluded that patients who received ONC201, either prior to or after disease progression, showed superior outcomes in terms of OS when compared to patients who never received ONC201. For patients who received ONC201 prior to disease progression, the same treatment setting being evaluated in the Phase 3 ACTION study, the median OS was 26.3 months (n=35). This was compared to 12 months for patients who did not receive ONC201 (n=274, $p<0.0001$). In the recurrent setting, patients treated with ONC201 (n=37) had a median overall survival of 16.2 months compared to 8.1 months for those not treated with ONC201 (n=99, $p=0.05$). The researchers concluded that ONC201 efficacy was enriched in patients treated prior to recurrence.

Separately, a poster presentation at SNO from xCures evaluated real world outcomes and treatment patterns among patients with Diffuse Midline Glioma (DMG), concluding that patients who received ONC201 survived longer than patients who were not treated with ONC201.

Natural Disease History Study

In addition, in December 2022, the Company reported data from its sponsored Natural Disease History study. The findings of this study support the poor prognosis for recurrent H3 K27M-mutant glioma patients. The study gathered data across eleven sites. The analysis was divided into two separate cohorts.

- *Overall Survival Cohort.* In relapsed patients who did not receive ONC201, the median overall survival following first disease progression was 5.1 months. This is in contrast to the previously reported ONC201 Phase 2 data set which showed a median OS of 13.7 months from the start of ONC201 treatment following disease progression. Rates of survival at 12 (57% (95% CI: 41 - 70%)) and 24 months (35% (95% CI: 21 - 49%)) in the ONC201 Phase 2 analysis were approximately 2 - 3 times the rates observed in this analysis of patients who did not receive ONC201 (survival at 12 (24% (95% CI: 12-38%)) and 24 months (11% (95% CI: 3.3-24.2))).
- *Objective Response Cohort.* The Company also evaluated objective response by RANO-HGG criteria in patients who received therapies other than ONC201 but met similar selection criteria used for the Phase 2 analysis of ONC201 designed to isolate single agent responses in the recurrent setting. In the two patients who were evaluable, neither achieved an objective response. The low number of patients who qualified was primarily due to the high prevalence of ONC201, bevacizumab and/or radiotherapy use following relapse, which would confound an objective response determination.

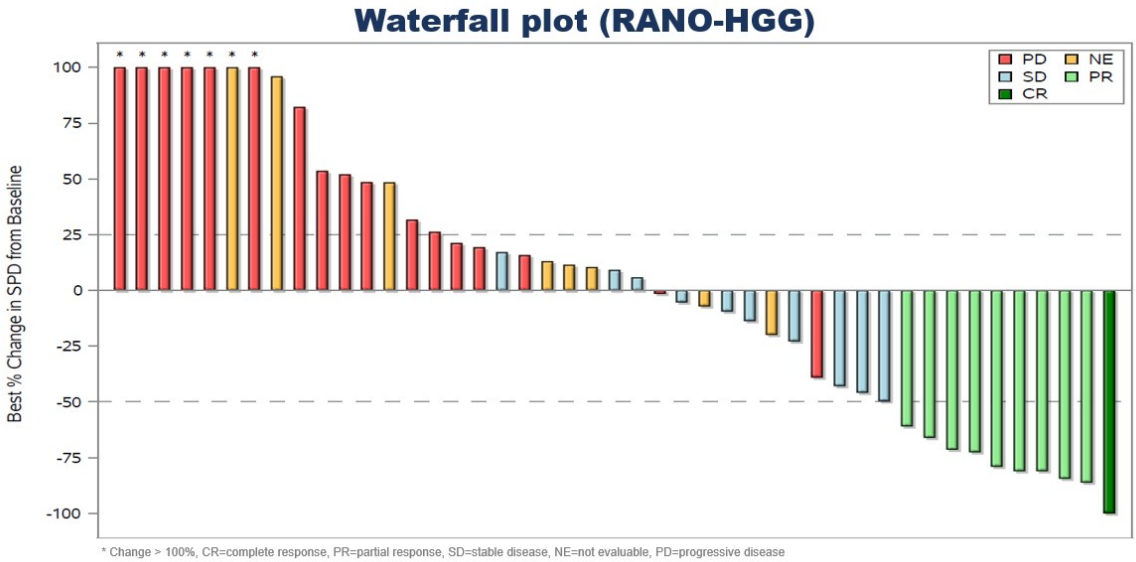
Blinded Independent Central Review (BICR) of ONC201 Patient Data

The ONC201 Phase 2 Efficacy Analysis by BICR in recurrent H3 K27M-mutant DMG demonstrated a 30% best overall response rate by Response Assessment in Neuro-Oncology criteria for high grade glioma (RANO-HGG) and/or low grade glioma (LGG). This data was based on strict criteria to ensure responses were attributable to a single agent. Each response required imaging and clinical criteria and was subject to a dual reader BICR.

RANO-HGG

As shown in the following waterfall plot, the RANO-HGG that quantitatively evaluates neuroimaging with contrast enhancement assessed by dual reader BICR with adjudication determined:

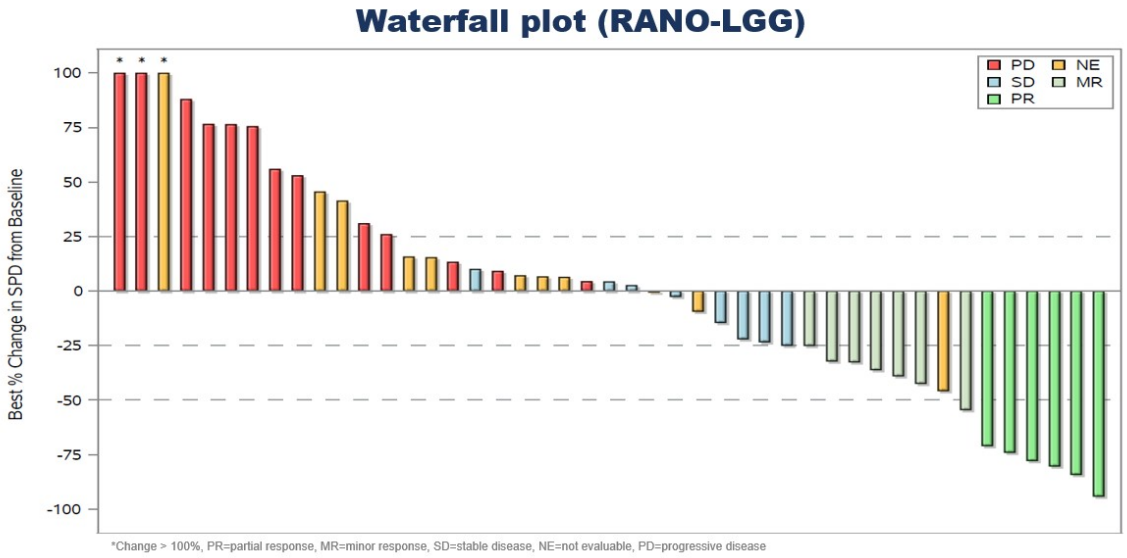
- Overall response rate (ORR) to be 20.0% (95% Confidence Interval (CI): 10.0 - 34%); including one complete response
- Disease control rate to be 40% (95% CI: 26 - 55%)



RANO-LGG

As shown in the following waterfall plot, the RANO-LGG that quantitatively evaluates neuroimaging without contrast enhancement assessed by dual reader BICR with adjudication determined:

- ORR to be 26% (95% CI: 15 - 40%)
- Disease control rate to be 42% (95% CI: 28 - 57%)



The proportion of patients achieving either a RANO-HGG and/or a RANO-LGG response was 30% (95% CI: 17.9 - 44.6%).

Among evaluable patients (those receiving at least 4mg of dexamethasone daily at baseline), 46.7% achieved at least a 50% confirmed reduction in corticosteroid dose. Among evaluable patients (those with a baseline performance status (KPS/LPS) score of 80 or lower), 20.6% achieved a confirmed improvement, indicative of improved quality of life.

Overall survival:

- 12 months: 57% (95% CI: 41 - 70%)
- 24 months: 35% (95% CI: 21 - 49%)

The cohort was comprised of the first 50 patients enrolled across five ONC201 clinical protocols, who met specific criteria designed to isolate the tumor response from ONC201 monotherapy, based on feedback from the FDA. These patients were two years of age or older, had measurable diffuse midline glioma with the H3 K27M-mutation, and had evidence of disease progression following prior therapy with radiation completed at least 90 days prior to enrollment.

One serious adverse event, considered to be possibly ONC201-related by the investigator and unlikely to be ONC201-related by the sponsor, was identified. Full safety data collection and analysis for this cohort is ongoing. Prior safety review of ONC201 identified the most commonly reported adverse events (AEs) as nausea/vomiting, fatigue and decreased lymphocyte counts.

Fast Track Designation by FDA

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.

ONC201 in Other Cancers

In addition to clinical trials in glioma, ONC201 has been evaluated in an open label Phase 2 investigator-initiated study that treated 30 patients at the Cleveland Clinic with rare neuroendocrine tumors. Paraganglioma patients were enrolled in two cohorts initiating ONC201 either once or twice weekly. A third cohort included patients with other neuroendocrine tumors, including desmoplastic small round cell tumor (DSRCT), dosed weekly with ONC201. The primary endpoint was radiographic response as measured by RECIST criteria. Investigator-assessed data from this study were presented at the annual meeting of the American Society of Clinical Oncology (ASCO) in 2021 and published in the journal *Clinical Cancer Research* in 2022.

In the cohort of recurrent metastatic paraganglioma patients receiving ONC201 monotherapy once weekly, 50% (5/10) of patients exhibited a partial response (PR) and two additional patients had stable disease (SD) that lasted longer than three months. Five of the 10 patients in this cohort were treated longer than one year. Among the cohort of paraganglioma patients receiving ONC201 twice weekly 1 PR and 7 SD were observed; this cohort includes four of eight patients who crossed over from the weekly dosing cohort. The third cohort of other neuroendocrine tumors included one PR (DSRCT) and two SD (DSRCT; neuroblastoma) that lasted longer than three months. Importantly, across all cohorts there was no decline in Karnofsky Performance Status (KPS) at week 12 for 93% of patients (28/30) and no dose modification due to treatment-related adverse events.

ONC206

ONC206 is an imipridone, DRD2 antagonist and ClpP agonist that has demonstrated enhanced non-competitive DRD2 antagonism relative to ONC201 in preclinical studies and additionally showed disruption of DRD2 homodimers. ONC206 exhibits nanomolar potency and showed anti-tumor activity in preclinical models of difficult-to-treat neuroendocrine tumors, endometrial cancer 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). In addition, the Pacific Pediatric Neuro-Oncology Consortium (PNOC), is conducting a dose escalating clinical trial of ONC206 for pediatric patients with central nervous system tumors.

In March 2023, the Company reported a finding of an investigator- assessed response in a recurrent glioblastoma patient without the H3K27M-mutation who received monotherapy ONC206 has emerged during dose escalation in the PNOC study.

ONC212

ONC212 is an imipridone, 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, inhibition of Ras signaling and selective killing of tumor cells. ONC212 showed broad-spectrum activity across both solid tumors and hematological malignancies, including ONC201-refractory pancreatic cancer and leukemias that exhibit high GPR132 and/or ClpP expression.

Initial IND-enabling studies with ONC212 have been completed and are being evaluated to determine next steps, including potentially first-in-human studies.

CMX521

CMX521 is a nucleoside analog antiviral drug candidate for the treatment of SARS-CoV-2. CMX521 is not mutagenic, clastogenic, or associated with mitochondrial toxicity. In addition, oral CMX521 demonstrated a favorable profile in GLP toxicology studies and was well-tolerated up to 2,400 mg in a healthy volunteer Phase 1 study for a different indication.

Pursuant to a 2006 agreement between the Company and The Regents of the University of Michigan (UM), the Company obtained an exclusive, worldwide license to UM's patent rights in certain inventions related to certain compounds originally synthesized at UM, including CMX521. Under the license agreement, the Company is permitted to research, develop, manufacture and commercialize products utilizing the UM Patent Rights, and to sublicense such rights subject to certain sublicensing fees and royalty payments.

Rapidly Emerging Antiviral Drug Development Initiative (READDI)

The Company is currently working with READDI at the University of North Carolina at Chapel Hill (UNC) which is the co-recipient of a grant for approximately $1.7 million from the state of North Carolina for the development of CMX521 as a potential treatment for SARS-CoV-2. READDI is a global public-private partnership founded at UNC by the UNC Eshelman School of Pharmacy, UNC School of Medicine, Gilling School of Global Public Health, Eshelman Institute for Innovation and the Structural Genomics Consortium. The grant will fund prodrug synthesis and animal studies to optimize delivery of CMX521 to the lungs via a convenient oral formulation. In addition, UNC will conduct COVID-19 disease mouse efficacy models and evaluate lung delivery of the active antiviral.

Chimerix Antiviral Chemical Library

The Chimerix Chemical Library contains over 10,000 heterocyclic ring systems and nucleosides. This library includes approximately 3,500 nucleoside analog compounds, most of which are candidates for lipid conjugation. In a collaboration with the scientists at UNC, we continue to evaluate our library of antiviral molecules to identify candidates that may have the potential to accelerate pandemic preparedness or response to SARS-CoV-2 (e.g. COVID-19) or other potential future pandemics.

TEMBEXA (brincidofovir, BCV)

TEMBEXA is a lipid conjugate which acts via inhibition of viral DNA synthesis that is a medical countermeasure for smallpox. On June 4, 2021, the FDA granted TEMBEXA approval for the treatment of smallpox. TEMBEXA is available in tablets and oral suspension. It is approved for adult and pediatric patients, including neonates. TEMBEXA was developed as a medical countermeasure for the treatment of smallpox under a collaboration with Biomedical Advanced Research and Development Authority (BARDA).

On August 26, 2022, the Company entered into a procurement contract (the BARDA Agreement) with BARDA for the delivery of up to 1.7 million treatment courses of tablet and suspension formulations of TEMBEXA® to the U.S. government. The BARDA Agreement consists of a five-year base period of performance and a total contract period of performance (base period plus option exercises) of up to ten years, if necessary.

On September 26, 2022, the Company sold its exclusive worldwide rights to brincidofovir, including TEMBEXA® and specified related assets (the Asset Sale) to Emergent. Upon closing of the Asset Purchase Agreement for the Asset Sale, the Company received $238 million upfront and could receive additional milestone payment of up to $136.5 million to be paid contingent upon the execution of optional future procurement awards from BARDA and other development milestones. The Company may also earn a 20% royalty on future gross profit of TEMBEXA in the United States associated with volumes above 1.7 million treatment courses of therapy during the exclusivity period of TEMBEXA. The agreement also allows the Company to earn a 15% royalty on all gross profit associated with TEMBEXA sales outside of the United States during the exclusivity period of TEMBEXA on a market-to-market basis.

The Company continues to provide operational support to Emergent in furtherance of its obligations under both the Asset Purchase Agreement (and related agreements) and the BARDA Agreement. The BARDA Agreement was novated to Emergent in December 2022.

Our Strategy

The principal components of our business strategy are to:

- **Successfully execute the randomized controlled Phase 3 ACTION study.** ONC201 is currently being developed for H3 K27M-mutant diffuse glioma. In November 2022 we initiated ACTION, a randomized, double-blind, placebo-controlled, multi-center Phase 3 international trial for newly diagnosed patients with H3 K27M-mutant diffuse glioma shortly following radiation with targeted enrollment of approximately 450 patients randomized 1:1:1 to receive ONC201 at one of two dosing frequencies or placebo. Available Phase 2 data demonstrate durable responses (as measured by RANO) in recurrent H3 K27M-mutant diffuse midline glioma associated with other forms of clinical benefit. The Phase 2 program was designed to isolate single agent activity in difficult treatment settings. Independent and company sponsored natural disease history studies support a potential survival advantage. The genetically selected patient population limits patient heterogeneity. In the

current neuro-oncology community there exists high awareness of ONC201 which we believe will aid in the enrollment of this study.

- **Upon approval, successfully commercialize ONC201.** Patients with H3 K27M mutant glioma are faced with a terminal disease with no known effective therapeutic options beyond radiation. In the current neuro-oncology community there exists high awareness of ONC201 which we believe will aid in the potential commercialization. The global potential annual revenue of ONC201 for its first indication exceeds ~$750 million, based on our internal estimates.
- **Maintain corporate capability and financial flexibility.** Our leadership team has successfully executed large-scale clinical studies and regulatory approvals of investigational agents. We intend to continue to leverage external capital to develop our early-stage pipeline consisting of ONC206, ONC212 and derivatives of CMX521.
- **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, 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

Emergent Biodefense Operations Lansing LLC

On September 26, 2022, the Company completed the Asset Sale to Emergent of the Company's exclusive worldwide rights to brincidofovir, including TEMBEXA® and specified related assets (the Asset Sale). Emergent paid the Company an upfront cash payment of approximately $238 million upon the closing of the Asset Sale. In addition, pursuant to the Asset Purchase Agreement, the Company is eligible to receive from Emergent: (i) up to an aggregate of approximately $124 million in milestone payments payable upon the exercise of the options under the BARDA Agreement for the delivery of up to 1.7 million treatment courses of tablet and suspension formulations of TEMBEXA to the U.S. government; (ii) royalty payments equal to 15% of the gross profits from the sales of TEMBEXA made outside of the United States; (iii) royalty payments equal to 20% of the gross profits from the sales of TEMBEXA made in the United States in excess of 1.7 million treatment courses; and (iv) up to an additional $12.5 million upon the achievement of certain other developmental milestones. The effects of recording certain adjustments associated with contingent consideration related to TEMBEXA have been excluded as the Company has made a policy election to account for these amounts when the contingency has been resolved in accordance with Accounting Standards Codification 450, Contingencies.

The Company continues to provide operational support to Emergent in furtherance of its obligations under both the Asset Purchase Agreement (and related agreements) and the BARDA Agreement. The BARDA Agreement was novated to Emergent LLC in December 2022. Under the Asset Purchase Agreement, the Company recognized approximately $0.5 million of contract revenue for support provided for the twelve months ended December 31, 2022.

The sale of TEMBEXA constitutes a significant disposition of a business, however, the Company determined the disposition does not represent a strategic shift, and accordingly, the Company has not accounted for the disposition as a discontinued operation. The Company recorded a $229.7 million net gain on sale of business in other income (loss) on the Consolidated Statement of Operations and Comprehensive Income (Loss) for the twelve months ended December 31, 2022.

2022 BARDA Procurement and Development Contract

On August 26, 2022, the Company entered into a procurement contract (the BARDA Agreement) with the Biomedical Advanced Research and Development Authority (BARDA) for the delivery of up to 1.7 million treatment courses of tablet and suspension formulations of TEMBEXA® to the U.S. government. The BARDA Agreement consists of a five-year base period of performance and a total contract period of performance (base period plus option exercises) of up to ten years (if necessary). Under the terms of the BARDA Agreement, the base period activities are valued at approximately $127 million, consisting of an initial shipment of treatment courses of TEMBEXA to be procured and shipped to the U.S. Government for an aggregate purchase price of approximately $115 million, and reimbursement for certain post-marketing activities of approximately $12 million. The options under the BARDA Agreement are valued at approximately $553 million (if all such options are exercised during the 10-year contract period), which consists of options to purchase up to an additional 1.381 million treatment courses of TEMBEXA for an aggregate purchase price of approximately $551 million and funding for certain post-marketing activities of approximately $2 million.

In connection with the sale of the TEMBEXA franchise to Emergent, the BARDA Agreement was novated to Emergent in December 2022. In accordance with federal regulations, the terms of the novation agreement require that the company

guarantee the performance of all obligations transferred to Emergent should Emergent not have the ability to deliver on the terms of the BARDA Agreement. In this instance BARDA may request that we perform the obligations in place of Emergent.

TEMBEXA International Supply Agreements

In June 2022, the Company entered into a Supply Agreement (the Supply Agreement) with a third-party outside of North America (the Purchaser), pursuant to which the Company was responsible for supplying to the Purchaser, and the Purchaser was responsible for purchasing from the Company, TEMBEXA treatment courses for use in a jurisdiction outside of the United States. Under the terms of the Supply Agreement, the Purchaser paid the Company an aggregate purchase price of approximately $9.3 million, in two equal installments in June 2022 and July 2022. The Company recognized $9.3 million of procurement revenue under the Supply Agreement for the twelve months ended December 31, 2022.

Additionally, in June 2022, the Public Health Agency of Canada (PHAC) awarded a Contract (the PHAC Contract) to the Company, pursuant to which PHAC agreed to purchase up to approximately $25.3 million (CAD $33.0 million) of TEMBEXA treatment courses for use in Canada. Substantially all of the procurement was delivered and accepted by PHAC in July 2022, completing the performance obligation for those shipments and resulting in $22.6 million of procurement revenue for the twelve months ended December 31, 2022. PHAC assigned the PHAC Contract to Emergent in November 2022. The remaining deliveries of treatment courses were delivered by Emergent and are subject to the royalty terms of the Asset Purchase Agreement applicable to gross profits outside the United States. The Company recognized approximately $0.4 million of royalty revenue in the twelve months ended December 31, 2022.

Merger Agreement with Oncoceutics

On January 7, 2021, we entered into an agreement 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) made an additional cash payment of $14.0 million 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 combined future net sales of ONC201 and ONC206 products of 15% up to $750 million in annual revenue and 20% above $750 million in annual revenue, 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. Pursuant to the merger agreement we have certain diligence obligations with respect to further development and commercialization of the Oncoceutics product candidates.

Ohara Pharmaceutical Co.

In 2019, Oncoceutics entered into a license, development and commercialization agreement with Ohara Pharmaceutical Co., Ltd. for ONC201 in Japan. We are entitled to receive up to $2.5 million in nonrefundable regulatory milestone payments, and to tiered royalties based on the aggregate annual net sales of all products, as defined in the agreement, in Japan.

China Resources Sanjiu Medical & Pharmaceutical Co., Ltd. (CR Sanjiu)

In December 2020, Oncoceutics entered into a license, development and commercialization agreement for ONC201 with China Resources Sanjiu Medical & Pharmaceutical Co., Ltd. (CR Sanjiu). Oncoceutics granted CR Sanjiu an exclusive royalty bearing license to develop and commercialize ONC201 in China, Hong Kong, Macau and Taiwan (CR Sanjiu Territory). We are entitled to receive up to $5.0 million in nonrefundable regulatory milestone payments, and to tiered royalties based on the aggregate annual net sales of all licensed products, as defined in the agreement, in the CR Sanjiu Territory.

Commercial Operations

If ONC201 is approved for H3 K27M-mutant glioma, we plan to commercialize ONC201 in the United States. We anticipate that commercialization 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 ourselves or through distribution or other collaboration arrangements. If we elect to develop ONC201 for other indications, we will 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 ONC201 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 ONC201 or any product candidate, 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 in the industry for potentially treating tumors which harbor the H3 K27M mutation. 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®; and
- 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.

Changes in the health care system may limit our ability to price ONC201 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 ONC201 has potential benefits over existing and potential competitive products, and as a result, we believe that our 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.

Imipridone Patent Portfolio

At February 15, 2023, our worldwide imipridone patent portfolio included:

- 416 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 213 US and foreign issued patents and 65 pending US and foreign applications related to ONC201; and

- 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.

Antiviral Patent Portfolio

At February 10, 2023, our worldwide antiviral patent portfolio included:

- 28 patents or patent applications that we own or have in-licensed from academic institutions, related to antivirals, which represented a decrease[1] over the number of patents in our patent portfolio at the end of fiscal year 2021;
- This includes 17 US and foreign exclusively and jointly owned patents and 11 US and foreign applications related to antivirals. Granted European patents are counted as one patent and have been validated throughout Europe;
- Five jointly-owned US and foreign patents and seven jointly-owned US patent applications related to our agreement with UM regarding our proprietary Chemical Library; and
- One US patent, one US patent application, one pending PCT application, and one European patent application exclusively owned by Chimerix directed to a morphic form of a compound from the Chemical Library.

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 portfolio, enhancing our freedom of action to exclusively sell our products, 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 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.

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 ONC201, our expanded access program for ONC201 and other clinical trials as well as for commercial purposes should ONC201 be approved. When produced on a commercial scale, we expect that cost-of-goods-sold relating to the imipridone class of assets will generally be in-line with that of other targeted oncology therapies.

The manufacturing processes for ONC201 drug substance and drug product are relatively straight-forward and generally in-line with other small molecule pharmaceutical compounds in terms of cost and complexity. The processes are robust and reproducible and do not require dedicated reactors or specialized equipment. The drug substance process uses common synthetic chemistry and readily available materials, including off-the-shelf and made-to-order starting materials, and is readily transferable. The drug product process uses common excipients and readily available materials, and is also readily transferable.

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. 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.

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 an 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 two 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.

U.S. Orphan Drug Designation

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.

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.

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.

U.S. 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.

There have been, and we expect that there will continue to be a number of federal and state proposals and enacted legislation to implement governmental pricing controls and limit the growth of healthcare costs, including the cost of prescription drugs.

For example, 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, on June 17, 2021 the U.S. Supreme Court dismissed a challenge on procedural grounds that argued the ACA is unconstitutional in its entirety because the "individual mandate" was repealed by Congress. The ACA may be subject to additional judicial or Congressional challenges in the future. It is unclear how such challenges and the healthcare reform measures of the Biden administration will impact ACA.

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, for example, in July 2021, the Biden administration released an executive order, "Promoting Competition in the American Economy," with multiple provisions aimed at prescription drugs. In response to Biden's executive order, on September 9, 2021, HHS released a Comprehensive Plan for Addressing High Drug Prices that outlines principles for drug pricing reform and sets out a variety of potential legislative policies that Congress could pursue to advance these principles. Additionally, the Inflation Reduction Act of 2022 has recently been enacted in an effort to control drug pricing for drugs that are covered by Medicare. 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.

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 five 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 to 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.

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, 2022, we had 89 full-time employees, which is prior to the effective date of the previously announced reduction in force of approximately 25%. Of these employees, 70 employees are engaged in research and development activities and 19 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 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 periodically 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, flexible working arrangements, including work-from-home arrangements, 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. Pursuing diversity in all forms, because diversity makes us better, is one of our Corporate Values. 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 21,325 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.

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

Except for the third quarter of 2022, we have incurred significant losses since our inception. We anticipate that we will continue to incur significant losses for the foreseeable future.

We are a biopharmaceutical company focused primarily on developing ONC201 for the treatment of H3 K27M-mutant glioma as we also evaluate programs to advance from our earlier stage pipeline. We have incurred significant net losses in each year since our inception prior to 2022, including a net loss of $173.2 million and $43.5 million for the twelve months ended December 31, 2021 and 2020, respectively. Our profitability for the twelve months ended December 31, 2022 was due primarily to a non-recurring event, the closing of our Asset Sale with Emergent. As of December 31, 2022, we had an accumulated deficit of approximately $713.4 million.

To date, with the exception of the Asset Sale, we have financed our operations primarily through the sale of equity securities and, to a lesser extent, through government funding, licensing fees, the sales of TEMBEXA product and debt. We have devoted most of our financial resources to research and development, including our preclinical development activities and clinical trials. 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 related to imipridones, including ONC201 for the treatment of H3 K27M-mutant glioma, and other potential indications;
- obtain regulatory approvals for ONC201 and other imipridones;
- scale-up manufacturing capabilities for ONC201 and other imipridones;
- 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.

We obtained regulatory approval for and initially commercialized TEMBEXA, however, none of our other product candidates have been commercialized. We may not succeed in developing additional product candidates 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. In addition to these risks in the United States, assuming regulatory approval in other geographies, 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.

Although we achieved profitability in 2022 as a result of the closing of our Asset Sale with Emergent, 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, and even if we generate future revenues, they may not be sufficient to lead to profitability.

Our ability to generate revenue and achieve profitability depends on our ability, alone or with collaborators, to successfully complete the development of, obtain the necessary regulatory approvals for 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 H3 K27M-mutant glioma, and other potential indications;
- obtaining United States regulatory approval for ONC201 and other pipeline assets;
- obtaining foreign regulatory approval(s) for ONC201 and other pipeline assets;
- 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 activate, enroll, and complete, and we may never successfully enroll a sufficient number of patients or 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.

Further, any product candidate if approved, may not achieve commercial success. Our commercial revenues, if any, will be derived from sales of products that may not be commercially available for a number of years, if at all. For any approved product candidate, 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 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, is currently being evaluated in multiple clinical studies including in the recently launched Phase 3 ACTION study, a registrational study for 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 ONC201, or any other product candidate;
- seek corporate partners for ONC201, 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.

If we draw down on our credit facility with Silicon Valley Bank, the terms of our loan and security agreement place restrictions on our operating and financial flexibility, and failure to comply with covenants or to satisfy certain conditions may result in acceleration of our repayment obligations and foreclosure on our pledged assets, which could significantly harm our liquidity, financial condition, operating results, business and prospects and cause the price of our securities to decline.

Our Loan and Security Agreement (the Loan Agreement) with Silicon Valley Bank, effective January 31, 2022, requires us to comply with certain financial covenants, including requiring that we maintain specified liquidity and cash levels at certain times. The Loan Agreement also requires us to comply with a number of other covenants (affirmative and negative), including restrictive covenants that limit our ability to, among other things, incur additional indebtedness; merge or consolidate with or into any other organization or otherwise suffer a change in control; acquire, own or make investments; repurchase or redeem any class of stock or other equity interest; declare or pay any cash dividend or make a cash distribution on any class of stock or other equity interest; and transfer a material portion of our assets, in each case subject to exceptions. Our obligations under the Loan Agreement are secured by a first priority perfected security interest in substantially all of our assets other than our intellectual property, subject to certain exceptions.

In addition to other specified events of default, and subject to limited exceptions, Silicon Valley Bank could declare an event of default upon our non-compliance with certain covenants or the occurrence of certain events that it may determine, in its sole discretion, to have a material adverse effect, including: a material adverse change in, or a material adverse effect on our business, property, assets or operations, taken as a whole; a material impairment of our ability to perform any of our obligations under the Loan Agreement; a material adverse effect upon the collateral for the loan or its value; or a material impairment of the enforceability or priority of the liens upon the collateral for the loan or the legality, validity, binding effect or enforceability of the Loan Agreement or related agreements.

If we default under the credit facility, Silicon Valley Bank may accelerate all of our repayment obligations, which may require us to seek additional or alternate financing and/or modify our operational plans. We cannot guarantee that we will be able to comply with all of the covenants contained in the Loan Agreement in the future, or secure waivers if or when required. If we are unable to comply with or obtain a waiver of any noncompliance under the Loan Agreement, Silicon Valley Bank could declare an event of default or require us to further renegotiate the Loan Agreement on terms that may be significantly less favorable to us, or we may be required to seek additional or alternative financing. If we were to seek additional or alternative financing, any such financing may not be available to us on commercially reasonable terms or at all. If we are unable to access funds to meet those obligations or to renegotiate our agreement, Silicon Valley Bank could foreclose on our pledged assets and we would have to immediately cease operations. In addition, during the continuance of an event of default, the then-applicable interest rate on the then-outstanding principal balance is subject to increase. Upon an event of default, Silicon Valley Bank could also require us to repay the loan immediately, together with a prepayment penalty, and other fees. If we were to renegotiate the agreement under such circumstances, the terms may be significantly less favorable to us. If we were liquidated, Silicon Valley Bank's right to repayment would be senior to the rights of our stockholders to receive any proceeds from the liquidation. Any declaration by Silicon Valley Bank of an event of default could significantly harm our liquidity, financial condition, operating results, business, and prospects and cause the price of our securities to decline.

In September 2022, Silicon Valley Bank and the Company agreed to suspend the availability of future advances under the Loan Agreement until such time the parties mutually agree to amend the Loan Agreement to, among other things, adjust the borrowing base and reset the covenants.

We may incur additional indebtedness in the future. The debt instruments governing such indebtedness may contain provisions that are as, or more, restrictive than the provisions governing our existing indebtedness. If we are unable to repay, refinance or restructure our indebtedness when payment is due, Silicon Valley Bank could proceed against the collateral or force us into bankruptcy or liquidation.

We routinely evaluate 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 January 2021, we acquired Oncoceutics, a privately-held, clinical-stage biotechnology company developing imipridones, including ONC201. In connection with this transaction, 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 risk factors. For example, in July 2019, we entered into a License and Development Agreement with Cantex Pharmaceuticals, Inc. pursuant to which we acquired exclusive worldwide rights to develop and commercialize DSTAT for any and all uses. In May 2022, we decided to discontinue the development of Dociparstat sodium (DSTAT) and the License and Development Agreement was subsequently terminated.

In addition to our current assets, 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 these matters 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

All of 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 of our current product candidates. Our most advanced product candidate is ONC201, which we are developing for the treatment of H3 K27M-mutant glioma. In November 2022, we initiated a Phase 3 clinical study of ONC201, and it is possible that a single trial to support regulatory approval may not be sufficient as the standard is two adequate and well-controlled Phase 3 trials.

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 any of our product candidates will depend on several factors, including the following:

- generating positive safety and efficacy data from our clinical trials of ONC201;
- receipt of marketing approvals from the FDA and corresponding regulatory authorities outside the United States;
- establishing commercial manufacturing capabilities;
- 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 our product candidates, including ONC201, which would materially harm our business.

We may be unable to obtain, or may be delayed in obtaining, regulatory approval for our most advanced clinical candidate: ONC201.

In January 2021, we acquired Oncoceutics, a privately-held, clinical-stage biotechnology company developing imipridones, a novel potential class of compounds. Oncoceutic's lead product candidate, ONC201, is currently being evaluated in the Phase 3 ACTION study, and multiple investigator-sponsored clinical studies.

We have reached general agreement with the FDA on the design of the Phase 3 study or studies to support a potential approval for marketing. We have not yet reached agreement with foreign regulators regarding the adequacy of the 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 consideration 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, 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 ONC201. 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 ONC201, 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. In the case of ONC201, early studies were open label studies of brain tumor patients, whereas the ongoing ACTION study is a double blinded, placebo-controlled, investigational study. 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 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;
- 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 outside our control;
- regulators or institutional review boards may require that we or our investigators suspend or terminate clinical research for various reasons, including noncompliance with regulatory or quality 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 ONC201. 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 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;
- changes in standard of care in specific diseases;
- time required to add new clinical sites; and
- delays by our contract manufacturers to produce and deliver sufficient supply of clinical trial materials.

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, in our Phase 2 study of ONC201, one serious adverse event, considered to be possibly ONC201-related by the investigator and unlikely to be ONC201-related by the sponsor, was identified. Full safety data collection and analysis for this cohort is ongoing. 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 any of our product candidates, including ONC201.

We cannot commercialize our product candidates, including ONC201, 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. Delays may occur because we may not be able to obtain accelerated approval for our product candidates and large confirmatory studies may be needed to support accelerated approval or be conducted to pursue a first full approval. For ONC201, a companion diagnostic test may be needed to identify patients with H3 K27M-mutant glioma before approval. 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.

Failure by us or third-party collaborators to successfully develop, validate and obtain regulatory approval for companion diagnostics for use by oncologists could harm our ability to develop and commercialize ONC201.

For ONC201, a standard of care diagnostic test is used to identify patients with H3 K27M-mutant glioma. Currently, that test is only available as a Laboratory Developed Test, or LDT, that has not been cleared or approved by FDA. FDA may require approval of a companion diagnostic in connection with an approval of ONC201 NDA. We intend to rely on third-parties for development of companion diagnostics for commercialization of ONC201, if required. Companion diagnostics are developed in conjunction with clinical programs for the associated product and are subject to regulation as medical devices. Any failure by a third-party to obtain FDA clearance or approval for an H3 K27M mutation diagnostic test may impair our ability to meet FDA requirements for ONC201 and subsequently jeopardize or delay a potential marketing authorization.

The FDA may determine that ONC201 or any of our other product candidates, even if approved for the designated rare pediatric disease prior to September 30, 2026, do not meet the eligibility criteria for a priority review voucher.

Upon regulatory approval of a product candidate for a designated rare pediatric disease, neglected tropical disease, or medical countermeasure, the FDA may award to the sponsor of the treatment a transferable voucher that enables the bearer to priority review of another product candidate.

The FDA has granted rare pediatric disease designation to ONC201 for treatment of H3 K27M-mutant glioma. Designation of 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. Absent any legislative 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.

Following regulatory approval for any of our product candidates, including ONC201, 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, 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 any of our product candidates 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.

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. Physicians, on the other hand, may prescribe products for off-label uses in the U.S. Although the FDA and other regulatory agencies do not regulate a physician's choice of drug treatment made in the physician's independent medical judgment, they do restrict promotional communications from companies or their sales force with respect to off-label uses of products for which marketing clearance has not been issued. However, companies may share truthful and not misleading information that is otherwise consistent with a product's FDA approved labeling. 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.

We may never obtain approval for or commercialize any of our 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 of our 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 ONC201, or any of our other current or future product candidates, which could make it difficult for us to sell profitably, if approved.

Market acceptance and sales of ONC201, or any other 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. Even if favorable coverage and reimbursement status is attained for our products candidates for which we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future. 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 healthcare professional 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 certain 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), other healthcare professionals (such as physician assistants and nurse practitioners), and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members; 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. However, there have been executive, judicial and Congressional challenges to certain aspects of the ACA. For example, on June 17, 2021, the U.S. Supreme Court dismissed a challenge on procedural grounds that argued the ACA is unconstitutional in its entirety because the "individual mandate" was repealed by Congress. It is possible that the ACA will be subject to additional challenges in the future. It is unclear how any such challenges and other litigation, and the healthcare reform measures of the Biden administration will impact the 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, presidential executive orders, 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, in July 2021, the Biden administration released an executive order with multiple provisions aimed at prescription drugs. In response to this executive order, in September 2021, the U.S. Department of Health and Human Services (DHHS) released a Comprehensive Plan for Addressing High Drug Prices that outlines principles for drug pricing reform and sets out a variety of potential legislative policies that Congress could pursue as well as potential administrative actions DHHS can take to advance these principles. In addition, on August 16, 2022, President Biden signed the Inflation Reduction Act of 2022 (IRA) into law, which among other things, (1) directs the DHHS to negotiate the price of certain single-source drugs and biologics covered under Medicare and (2) imposes rebates under Medicare Part B and Medicare Part D to penalize price increases that outpace inflation. These provisions will take effect progressively starting in fiscal year 2023, although they may be subject to legal challenges. It is currently unclear how the IRA will be implemented but is likely to have a significant impact on the pharmaceutical industry. While the Inflation Reduction Act of 2022 predominantly focuses on controlling spending of drugs that are covered by Medicare, and our product candidates, if approved, are not expected to target the Medicare population, other similar legislation may be implemented in the future that may be broader in scope and may adversely affect our operations, including our ability to commercialize our product candidates, if approved, successfully. Additionally, the Biden administration released an additional executive order on October 14, 2022, directing DHHS to submit a report on how the Center for Medicare and Medicaid Innovation can be further leveraged to test new models for lowering drug costs for both Medicare and Medicaid beneficiaries. It is unclear whether this executive order or similar policy initiatives will be implemented in the future. 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. 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. 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.

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 outside our control;
- 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.

Manufacturing issues may arise that could increase product and regulatory approval costs or delay or impair commercialization of ONC201 or our other product candidates.

We plan to validate ONC201 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 ONC201 with the FDA. If supply is interrupted, there could be a significant disruption in the clinical supply. An alternate vendor would need to be qualified which could result in a further delay.

As more batch data is generated during both pre- and 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 our products and product candidates. 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 our products and product candidates, increases in our operating expenses, or failure to obtain or maintain approval for ONC201.

The anticipated benefits of the sale of our TEMBEXA program and related assets may not be realized fully or at all or may take longer to realize than expected.

In September 2022, we completed the sale of our TEMBEXA program and related assets to Emergent Biodefense Operations Lansing LLC (Emergent). Under the terms of the sale, we are entitled to contingent consideration, including milestone payments and royalties, dependent upon the further development and commercial success of TEMBEXA. Accordingly, our ability to receive the contingent consideration will depend, in part, on Emergent's ability to successfully develop and commercialize TEMBEXA. If Emergent is unable to successfully or timely integrate TEMBEXA operations into its business, it may not be able to realize the revenue growth, milestone achievements, synergies and other anticipated benefits resulting from the Asset Sale, and consequently, we may not receive all, or any, of the contingent payments under the Purchase Agreement. The milestones set forth in the Purchase Agreement may not be achieved on a timely basis, if at all, and we may not receive any future contingent payments. Any failure to achieve such milestones, or a perception that the milestones may not be achieved, may adversely affect our business and the value of our common stock.

Moreover, in 2019, we entered into a licensing arrangement with SymBio Pharmaceuticals (SymBio), whereby SymBio is responsible for the future development and commercialization of TEMBEXA for human diseases other than orthopoxviruses, including smallpox. In connection with the sale of TEMBEXA worldwide rights to Emergent, our rights and obligations under the SymBio license agreement were assumed by Emergent. We could receive up to $12.5 million from Emergent in brincidofovir regulatory milestones related to the SymBio license agreement. Our right to receive milestone payments under the Asset Purchase Agreement depends on the achievement of certain regulatory milestones by SymBio in the licensed indications.

The development and commercialization of the non-orthopox uses of TEMBEXA in humans and our ability to receive potential milestone payments under the Asset Purchase Agreement, would be adversely affected if SymBio:

- lacks or does not devote sufficient time and resource to the development of TEMBEXA;
- lacks or does not devote sufficient capital to fund the development of TEMBEXA;
- develops, either alone or with others, products that compete with TEMBEXA;
- fails to gain the requisite regulatory approvals for TEMBEXA;
- does not conduct its activities in a timely manner;
- terminates its license with Emergent;
- does not effectively pursue and enforce intellectual property rights relating to TEMBEXA; 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. If any of these issues arise, it may delay or eliminate our ability to receive the regulatory milestones in the Asset Purchase Agreement.

Emergent may not adequately perform according to the terms of the BARDA Contract, and we might be required to guarantee performance of all obligations that Emergent assumed under novation.

As required by U.S. government contracting regulations, the novation agreement for the BARDA Contract includes a clause requiring that Chimerix, as transferor, guarantee Emergent's performance of the BARDA Contract. If Emergent were to fail to manufacture or deliver treatment courses of TEMBEXA, fail to properly respond to a product recall, or breach other performance obligations, BARDA may require that we perform instead, which may cause us to file claims under our insurance policies, divert the attention of our management from company priorities, expend additional resources engaging vendors, require additional legal agreements with Emergent to enable Chimerix to resume title to TEMBEXA and control of supply chain vendors necessary for performance, incur additional legal fees, among other unplanned expenses which could delay or prevent our completion of our priority clinical programs, as well as result in reputational harm.

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 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 ONC201, 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 agencies.

Following receipt of marketing approval, a product or product candidate may 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 other product candidates, including ONC201, 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 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.

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 sustainably generate 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 ONC201, 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, 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 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 any of our drug candidates that we are currently developing or that we may develop including ONC201.

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 ONC201, 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 ONC201; 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 an approved product 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, 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 United States Government Contracts and Grants

Unfavorable provisions in government contracts, 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 any contract with the U.S. government, the U.S. government has the power to unilaterally:

- audit and object to any 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 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 any contract based on violations or suspected violations of laws or regulations;
- terminate any 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 any contract;
- decline to exercise an option to continue any 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 any contract.

The U.S. government also has the right to terminate any 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 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. 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.

In 2022, the National Institutes of Health (NIH) Division of Financial Advisory Services (DFAS) initiated a routine audit related to the BARDA development contract. This audit is a scheduled audit and not in response to any allegations of misconduct or impropriety.

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 TEMBEXA. 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 our product candidates 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. Patient demand for ONC201 or ONC206 outside of our clinical trial could impair the conduct or delay the completion of our controlled clinical trials. We have amended the protocol of our open expanded access program to focus on patients that are not eligible for

the Phase 3 ACTION study. Therefore, the Phase 3 ACTION study will serve as the main mechanism for a patients with newly diagnosed H3 K27M-mutant diffuse glioma following completion of radiotherapy to receive ONC201. This decision could prompt adverse publicity or other disruptions related to potential participants in such expanded access programs.

Competition for Phase 3 ACTION study eligible patients from Investigator Initiated Clinical Trials (IITs) could result in losses.

We currently support the Biological Medicine for Diffuse Intrinsic Pontine Glioma (DIPG) Eradication (BIOMEDE 2) IIT, sponsored by Gustave Roussy, in Paris France. It is a multicenter, randomized open-label phase-3 controlled trial evaluating efficacy of ONC201 in comparison with everolimus (primary objective based on internal comparison) and subsequently to historical controls. Currently, the BIOMEDE 2 study is open to patients who may be otherwise eligible for the Phase 3 ACTION study. The competing enrollment may have a negative effect on our ability to enroll the Phase 3 ACTION Study. Patients may prefer to enroll in the BIOMEDE 2 IIT instead of the Phase 3 ACTION study because that study does not contain a placebo control arm. Patient preference for the BIOMEDE 2 IIT could impair the conduct or delay the initiation or completion of the Phase 3 ACTION study. If initiation or completion of the Phase 3 ACTION study is delayed, our development costs may increase, our approval process could be delayed, any periods during which we may have the exclusive right to commercialize ONC201 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. We recently worked with another IIT sponsor to amend the protocol to remove potentially Phase 3 ACTION study eligible patients. This decision could prompt adverse publicity or other disruptions related to potential participants in the IITs.

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. As of December 31, 2022, approximately 95.9% 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.

The share reserves under our 2013 Equity Incentive Plan (the 2013 Plan) and 2013 Employee Stock Purchase Plan (ESPP) were previously subject to automatic annual increases on January 1st of each year. In the future, subject to limited exceptions, we will be required to seek stockholder approval of future increases to the number of shares underlying our 2013 Plan (or a successor plan) and ESPP. In the event we are unable to obtain stockholder approval of such future increases, our ability to attract, retain and motivate employees through the use of share-based compensation would be substantially curtailed.

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 ONC201, 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 ONC201; and
- decreased demand for our product candidates, if approved for commercial sale.

We currently carry $15 million per occurrence, and $15 million in the aggregate in product liability insurance covering our United States clinical trials, with additional local coverage as required for the other countries in which we conduct our trials, but not yet extending coverage to commercial sales. 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.

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 ONC201;
- termination of any of our license or collaboration agreements;
- developments regarding the sale of our TEMBEXA program and specified related assets to Emergent;
- 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, 2022, our then executive officers, directors, 5% stockholders (known to us through available information) and their affiliates beneficially owned approximately 30.8% 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.

Shareholder activism could cause material disruption to our business.

Publicly traded companies have increasingly become subject to campaigns by activist investors advocating corporate actions such as actions related to financial restructuring, dividends, share repurchases and even sales of assets or the entire company.

For example, our shareholder Rubric Capital Management (Rubric) issued a press release and filed a Schedule 13D in November 2022, in which Rubric expressed a lack of confidence in the Company's strategic direction. In response, the Company issued a press release in which we stated we do not believe a liquidation of the Company is in the best interests of all of our shareholders as it would deprive them of the significant upside potential of ONC201 and our other assets. We also stated it would be irresponsible to patients with this deadly disease as it would halt critical progress on ONC201. We stated we are confident that the continued successful execution of our strategy is the best path to maximize shareholder value, and that our Board and leadership team regularly consider all opportunities to create or enhance value.

Responding to proxy contests and other actions by Rubric or other activist investors could be costly and time-consuming, disrupt our operations and divert the attention of our board of directors and senior management from the pursuit of our business strategies, which could adversely affect our results of operations and financial condition.

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.

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. For example, 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. 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). To the extent we seek, and our stockholders approve, future increases to the number of shares underlying our 2013 Plan (or a successor plan) and ESPP, 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 investment-grade, interest-bearing securities with maturities less than 24 months. 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.

Changes in tax laws or regulations that are applied adversely to us or our customers may have a material adverse effect on our business, cash flow, financial condition or results of operations.

New tax laws, statutes, rules, regulations or ordinances could be enacted at any time. Further, existing tax laws, statutes, rules, regulations or ordinances could be interpreted differently, changed, or modified. Any such enactment, interpretation, change or

modification could adversely affect us, possibly with retroactive effect. For example, the recently enacted IRA imposes, among other rules, a 15% minimum tax on the book income of certain large corporations and a 1% excise tax on certain corporate stock repurchases. .Changes in corporate tax rates, the realization of net deferred tax assets relating to our operations, the taxation of foreign earnings, and the deductibility of expenses under the Tax Act as amended by the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) or any future tax reform legislation, could have a material impact on the value of our deferred tax assets, could result in significant one-time charges, and could increase our future U.S. tax expense.

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 federal net operating loss (NOL) carryforwards generated in tax years beginning before January 1, 2018, are only permitted to be carried forward for 20 years under applicable U.S. tax law. Under the Tax Act, as amended by the CARES Act, our federal NOLs generated in tax years beginning after December 31, 2017 may be carried forward indefinitely, but the deductibility of such federal NOLs is limited. It is uncertain if and to what extent various states will conform to the Tax Act or the CARES Act.

In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended (the Code), 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 certain other pre-change federal tax attributes (such as research tax credits) to offset its post-change income or taxes may be limited. We may experience ownership changes in the future as a result of subsequent shifts in our stock ownership, some of which are outside our control. As a result, our ability to use our federal carryforwards and certain other pre-change federal tax attributes (such as research tax credits) to offset our post-change income or taxes could be limited. 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 NOL carryforwards is suspended or otherwise limited. As a result, we may be unable to use all or a material portion of our state NOL carryforwards and other state tax attributes, which could accelerate or permanently increase state taxes owed.

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 21,325 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.

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.

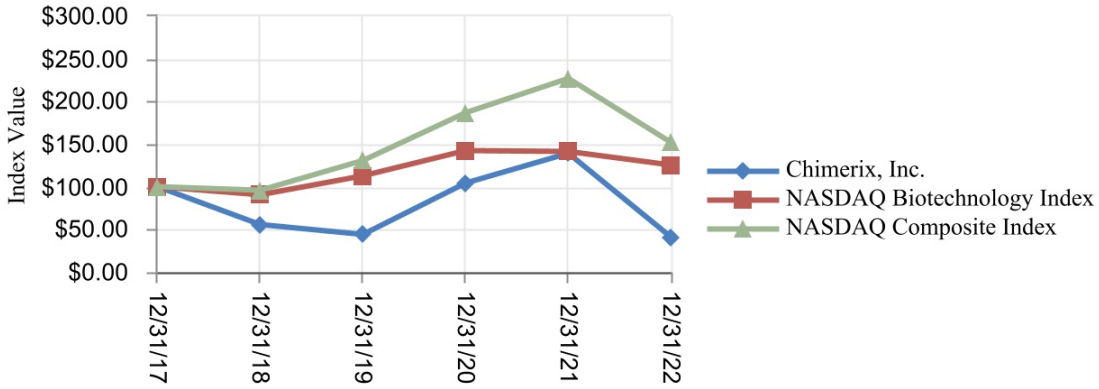
PART II

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, 2017 through December 31, 2022 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, 2017. 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 12/31/2017 (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 24, 2023, there were 72 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. Additionally, the Loan Agreement may prohibit us from declaring or paying dividends.

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. RESERVED

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 (Chimerix, we, our, us or the Company) is a biopharmaceutical company whose mission it is to develop medicines that meaningfully improve and extend the lives of patients facing deadly diseases. The Company is focused on developing imipridones as a potential new class of selective cancer therapies. The most advanced imipridone is dordaviprone (ONC201) which is in clinical-stage development for H3 K27M-mutant glioma as its lead indication. In addition, imipridone ONC206 is currently in dose escalating clinical trials.

Recent Developments

Dordaviprone, ONC201

Launch of the Phase 3 ACTION Study

In November 2022, Chimerix announced the launch of its Phase 3 ACTION study at the annual Society for Neuro-Oncology (SNO) conference. The ACTION trial enrolls patients shortly after they have completed front-line radiation therapy that is the standard of care for glioma. The study is designed to enroll 450 patients randomized 1:1:1 to receive ONC201 at one of two dosing frequencies or placebo. Participants will be randomized to receive either: (i) 625mg of ONC201 once per week (the Phase 2 dosing regimen), (ii) 625mg twice per week on two consecutive days or (iii) placebo. The study is open to pediatric and adult patients >10kg body weight and the dose will be scaled by body weight for patients weighing less than 52.5kg. Primary endpoints include Overall Survival (OS) and progression free survival (PFS). OS will be assessed for efficacy at three alpha-allocated timepoints consisting of two interim assessments by the Independent Data Monitoring Committee (IDMC) at 164 events and 246 events, respectively, and a final assessment at 327 events. The final PFS analysis will be performed after 286 events, with progression assessed using response assessment in neuro-oncology-high grade glioma (RANO HGG) and response assessment in neuro-oncology-low grade glioma (RANO-LGG) criteria by blinded independent central review (BICR). Secondary endpoints include corticosteroid response, performance status response, change from baseline in quality of life (QoL) assessments and change from baseline in neurologic function as assessed by the Neurologic Assessment in Neuro-Oncology (NANO) scale.

Our plan is to initiate a submission to regulators for approval upon a positive overall survival analysis at either of the interim or the final overall survival analyses. The first submission for marketing authorization will likely be initiated in the US with submissions outside the US to follow. In addition, in the event the result of the progression free survival analysis is positive, we would discuss the potential for submission and approval of ONC201 with the regulatory authorities based on this data.

External and Company sponsored natural disease history study supports OS advantage in patients who received ONC201

At the annual SNO conference two external presentations reported an OS advantage in patients who received ONC201. An OS analysis of academic investigators who evaluated clinical trials and institutional experiences in the United States and Europe indicated superior outcomes for patients who received ONC201, either prior to or after disease progression, compared to patients who never received ONC201. For patients who received ONC201 prior to disease progression, the same treatment setting being evaluated in the Phase 3 ACTION study, the median OS for patients who received ONC201 was 26.3 months (n=35). This was compared to 12 months for patients who did not receive ONC201 (n=274, $p<0.0001$). In the recurrent setting, patients treated with ONC201 (n=37) had a median overall survival of 16.2 months compared to 8.1 months for those not treated with ONC201 (n=99, p=0.05). Authors concluded that ONC201 efficacy was enriched in patients treated prior to recurrence.

Separately, a poster presentation at SNO from xCures evaluated real world outcomes and treatment patterns among patients with DMG, which also concluded ONC201 meaningfully extends OS in patients with DMG. In addition, in December 2022, we reported data from our sponsored Natural Disease History study that supports poor prognosis for recurrent H3 K27M-mutant glioma patients. The study gathered data across eleven sites in patients who did not receive ONC201.

Overall Survival Cohort. In relapsed patients who did not receive ONC201, the median overall survival following first disease progression was 5.1 months. This is in contrast to the previously reported ONC201 Phase 2 data set which showed a median OS of 13.7 months from the start of ONC201 treatment following disease progression. Rates of survival at 12 and 24 months in the ONC201 Phase 2 analysis were approximately 2 - 3 times the rates observed in this analysis of patients who did not receive ONC201.

Objective Response Cohort. The Company also evaluated objective response by RANO-HGG criteria in patients who received therapies other than ONC201 but met similar selection criteria used for the Phase 2 analysis of ONC201 designed to isolate single agent responses. In the two patients who were evaluable, neither achieved an objective response. The low number of patients who qualified was primarily due to the high prevalence of ONC201, bevacizumab and radiotherapy use during that period of relapse, which would confound an objective response determination.

The ONC201 Phase 2 Efficacy Analysis by Blinded Independent Central Review (BICR) in recurrent H3 K27M-mutant DMG demonstrated a 30% Response Assessment in Neuro-Oncology criteria for high grade glioma (RANO HGG) and/or low grade glioma (LGG). This data was based on a strict criteria to ensure responses were attributable to a single agent. Each response required imaging and clinical criteria and subject to a dual reader BICR.

Early Pipeline Development – ONC206, ONC212 and CMX521

ONC206 is a second generation, potentially differentiated imipridone, that has demonstrated anti-cancer activity in pre-clinical models. ONC206 is currently being evaluated in Phase I dose escalation trials in partnership with the National Institutes of Health (NIH) and with the Pacific Pediatric Neuro-Oncology Consortium (PNOC). In March 2023, the Company reported a finding of an investigator-assessed response in a recurrent glioblastoma patient without the H3K27M-mutation who received monotherapy ONC206 has emerged during dose escalation in the PNOC study.

ONC212, which targets GPR132 and ClpP, has completed IND-enabling toxicology studies. Subject to supportive data, we expect to conduct first-in-human trials as next steps. ONC212 is being explored pre-clinically in collaboration with MD Anderson Cancer Center and Brown University.

CMX521

CMX521 is a nucleoside analog antiviral drug candidate for the treatment of SARS-CoV-2. CMX521 is not mutagenic, clastogenic, or associated with mitochondrial toxicity. In addition, oral CMX521 demonstrated a favorable profile in GLP toxicology studies and was well-tolerated up to 2,400 mg in a healthy volunteer Phase 1 study for a different indication.

Pursuant to a 2006, agreement between the Company and The Regents of the University of Michigan (UM), the Company obtained an exclusive, worldwide license to UM's patent rights in certain inventions related to certain compounds originally synthesized at UM, including CMX521. Under the license agreement, the Company is permitted to research, develop, manufacture and commercialize products utilizing the UM Patent Rights, and to sublicense such rights subject to certain sublicensing fees and royalty payments.

We are currently working with the Rapidly Emerging Antiviral Drug Development Initiative (READDI) at the University of North Carolina at Chapel Hill (UNC) which is the co-recipient of a grant for approximately $1.7 million from the state of North Carolina for the development of CMX521 as a potential treatment for SARS-CoV-2. The grant will fund prodrug synthesis and

animal studies to optimize delivery of CMX521 to the lungs via a convenient oral formulation. In addition, UNC will conduct COVID-19 disease mouse efficacy models and evaluate lung delivery of the active antiviral.

TEMBEXA (brincidofovir, BCV)

On September 26, 2022, we closed the Asset Sale with Emergent Biodefense Operations Lansing LLC (Emergent), upon which we received $238 million upfront and could receive additional milestones of up to $136.5 million to be paid contingent upon execution of optional future procurement awards from the Biomedical Advanced Research and Development Authority (BARDA) and other development milestones. We are also entitled to earn a 20% royalty on future gross profit of TEMBEXA in the United States associated with volumes above 1.7 million treatment courses of therapy during the exclusivity period of TEMBEXA. The agreement also allows us to earn a 15% royalty on all gross profit associated with TEMBEXA sales outside of the United States during the exclusivity period of TEMBEXA on a market-to-market basis.

We continue to provide operational support to Emergent in furtherance of our obligations under both the Asset Purchase Agreement (and related agreements) and the BARDA Agreement. The BARDA Agreement was novated to Emergent in December 2023.

Additionally, in light of the on-going transition of TEMBEXA to Emergent, the size of the Company was reduced by approximately 25% in order to focus our development capability and capital allocation to our oncology pipeline.

Business Development Review

In addition to our prior business development transactions, 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, 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 or action.

Financial Overview

Revenues

To date, we have generated modest, non-recurring revenue from product sales. Prior to 2022, all of our revenue to date has been derived from government grants and a contract and the receipt of up-front proceeds under our collaboration and license agreements.

Emergent BioSolutions, Inc.

On September 26, 2022, the Company closed the previously disclosed Asset Sale with Emergent. Emergent paid the Company an upfront cash payment of approximately $238 million upon closing. In addition, pursuant to the Asset Purchase Agreement, the Company is eligible to receive from Emergent: (i) up to an aggregate of approximately $124 million in milestone payments payable upon the exercise of the options under the BARDA Agreement; (ii) royalty payments equal to 15% of the gross profits from the sales of TEMBEXA made outside of the United States; (iii) royalty payments equal to 20% of the gross profits from the sales of TEMBEXA made in the United States in excess of 1.7 million treatment courses; and (iv) up to an additional $12.5 million upon the achievement of certain other developmental milestones.

The Company continues to provide operational support to Emergent in furtherance of the obligations under both the Asset Purchase Agreement (and related agreements) and the BARDA Agreement. The BARDA Agreement was novated to Emergent in December 2022. Under Asset Purchase Agreement, the Company recognized approximately $0.5 million of contract revenue for support provided for the twelve months ended December 31, 2022.

TEMBEXA Procurement Agreements

In June 2022, the Company entered into a Supply Agreement (the Supply Agreement) with a third-party outside of North America (the Purchaser), pursuant to which the Company was responsible for supplying to the Purchaser, and the Purchaser was responsible for purchasing from the Company, TEMBEXA treatment courses for use in a jurisdiction outside of the United States. Under the terms of the Supply Agreement, the Purchaser paid the Company an aggregate purchase price of approximately $9.3 million, in two equal installments in June 2022 and July 2022. The Company recognized $9.3 million of procurement revenue under the Supply Agreement for the twelve months ended December 31, 2022.

Additionally, in June 2022, the Public Health Agency of Canada (PHAC) awarded a Contract (the PHAC Contract) to the Company, pursuant to which PHAC agreed to purchase up to approximately $25.3 million (CAD $33.0 million) of TEMBEXA treatment courses for use in Canada. Substantially all of the procurement was delivered and accepted by PHAC in July 2022, completing the performance obligation for those shipments and resulting in $22.6 million of procurement revenue for the twelve months ended December 31, 2022. PHAC assigned the PHAC Contract to Emergent in November 2022. The remaining deliveries of treatment courses were delivered by Emergent and are subject to the royalty terms of the Asset Purchase Agreement applicable to gross profits outside the United States. The Company recognized approximately $0.4 million of royalty revenue in the twelve months ended December 31, 2022.

BARDA

In February 2011, we entered into a cost-plus fixed fee development contract with BARDA. Under the contract we received $72.5 million in expense reimbursement and $4.6 million in fees. The contract expired in accordance with its terms in September 2021. Under the BARDA contract, we recognized contract revenue of $1.6 million and $5.3 million during the twelve months ended, December 31, 2021 and 2020, respectively.

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 primarily 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,		
	2022	**2021**	**2020**
Direct research and development expenses	$ 42,227	$ 26,808	$ 19,125
Research and development personnel costs - excluding stock-based compensation	18,615	17,709	11,543
Research and development personnel costs - stock-based compensation	8,267	6,611	2,969
Indirect research and development expenses	2,522	22,689	2,595
Total research and development expenses	$ 71,631	$ 73,817	$ 36,232

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.

Imipridones program

In January 2021, we acquired Oncoceutics. In connection with the transaction, we recorded $82.9 million of acquired in-process research and development expenses for the three months ended March 31, 2021, which included $25.0 million for an upfront payment to Oncoceutics, $43.4 million related to the fair value of 8,723,769 shares of common stock issued to Oncoceutics, a $14.0 million promissory note due on the one-year anniversary of the acquisition, and $0.3 million related to transaction costs consisting primarily of legal and professional fees. As we continue to develop and prepare ONC201 for U.S. regulatory approval, we expect to incur significant research and development expense. We also plan to incur development expenses in connection with the continued development of other Oncoceutics compounds, including ONC206 and ONC212.

TEMBEXA (Brincidofovir, BCV)

We developed TEMBEXA for the treatment of smallpox. FDA marketing approval for TEMBEXA was received on June 4, 2021. Under our February 2011 cost-plus-fixed fee development contract with BARDA, we incurred expenses in connection with the development of orthopoxvirus animal models, the demonstration of efficacy and pharmacokinetics of TEMBEXA in the animal models, the conduct of clinical studies for subjects with DNA viral infections, the manufacture and process validation of bulk drug substance and TEMBEXA 100 mg tablets and TEMBEXA 10 mg/mL oral suspension, and submission of the NDAs to the FDA. In addition, we have incurred additional supportive costs for the development of TEMBEXA for smallpox that we did not seek reimbursement for from BARDA. We have incurred costs related to the manufacturing of TEMBEXA for a procurement contract. These costs were expensed as incurred until the June 2021 FDA approval. Following the approval, costs related to the manufacturing of TEMBEXA are recorded and shown as inventories on the Consolidated Balance Sheets. With the sale of TEMBEXA to Emergent all inventory, prepaids and liabilities associated with TEMBEXA were transferred to Emergent as part of the transaction.

Dociparstat sodium (DSTAT)

With the decision to stop development of DSTAT, we are currently in the process of closing our Phase 3 DASH AML trial. Due to the decision to terminate the program we have $1.3 million of accounts payable and contract close-out accruals as of December 31, 2022. We expect the close-out activities related to this program to extend through mid-2023 as we continue treatment for enrolled patients on the trial and close down clinical trial sites.

General and Administrative Expenses

General and administrative expenses consist primarily of salaries and related costs for employees in executive, finance, commercial, 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 accounting and legal services, costs of various consultants, director and officer liability insurance, occupancy costs and information systems.

Gain on Sale of Business, Net

Emergent BioSolutions, Inc.

The previously mentioned sale of TEMBEXA constitutes a significant disposition of a business, however, the Company determined the disposition does not represent a strategic shift, and accordingly, the Company has not accounted for the disposition as a discontinued operation. The Company recorded a $229.7 million net gain on sale of business in other income (loss) on the Consolidated Statement of Operations and Comprehensive Income (Loss) for the twelve months ended December 31, 2022.

Interest Income and Other, Net

Interest income and other, net consists primarily of interest earned on our cash, cash equivalents and short-term and long-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 $15.3 million, $12.3 million and $5.6 million was recognized in the years ended December 31, 2022, 2021 and 2020, 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.

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, 2022 included in this Annual Report. We believe that our accounting policies relating to revenue recognition, research and development prepaids and accruals, acquired IPR&D, inventories, employee retention credit, investments, share-based compensation and utilization of net operating loss carryforwards 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) procurement revenue - revenue related to sales of TEMBEXA prior to the Asset Sale, (ii) contract and grant revenue - revenue generated under federal and private foundation grants and contracts, (iii) licensing revenue - revenue related to non-refundable upfront fees, royalties and milestone payments earned under license agreements, and (iv) royalty revenue - revenue related to sales of TEMBEXA made by Emergent after the Asset Sale. 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.

TEMBEXA Procurement Agreements

In June 2022, the Company entered into the Supply Agreement and the PHAC Contract, pursuant to which the Company was responsible for supplying TEMBEXA (brincidofovir) treatment courses for use outside of the United States. There are no material performance obligations outside of delivery in the agreements, therefore revenue related to these procurement agreements was recognized when the delivery performance obligation was satisfied. Revenue was recognized based on price per treatment course as outlined in the agreements. For the twelve months ended December 31, 2022, the Company recognized $32.0 million of procurement revenue related to these agreements.

The PHAC Contract was assigned to Emergent in November 2022. The remaining deliveries of treatment courses were delivered by Emergent and are subject to the royalty terms of the Asset Purchase Agreement applicable to gross profits outside

the United States. The Company recognized approximately $0.4 million of royalty revenue in the twelve months ended December 31, 2022.

Emergent Biodefense Operations Lansing LLC

On September 26, 2022, the Company completed the Asset Sale to Emergent of the Company's exclusive worldwide rights to brincidofovir, including TEMBEXA® and specified related assets (the Asset Sale). Emergent paid the Company an upfront cash payment of approximately $238 million upon the closing of the Asset Sale. In addition, pursuant to the Asset Purchase Agreement, the Company is eligible to receive from Emergent: (i) up to an aggregate of approximately $124 million in milestone payments payable upon the exercise of the options under the BARDA Agreement for the delivery of up to 1.7 million treatment courses of tablet and suspension formulations of TEMBEXA to the U.S. government; (ii) royalty payments equal to 15% of the gross profits from the sales of TEMBEXA made outside of the United States; (iii) royalty payments equal to 20% of the gross profits from the sales of TEMBEXA made in the United States in excess of 1.7 million treatment courses; and (iv) up to an additional $12.5 million upon the achievement of certain other developmental milestones. The effects of recording certain adjustments associated with contingent consideration related to TEMBEXA have been excluded as the Company has made a policy election to account for these amounts when the contingency has been resolved in accordance with Accounting Standards Codification 450, Contingencies.

The Company continues to provide operational support to Emergent in furtherance of its obligations under both the Asset Purchase Agreement (and related agreements) and the BARDA Agreement. The BARDA Agreement was novated to Emergent in December 2022. Under the Asset Purchase Agreement, the Company recognized approximately $0.5 million of contract revenue for support provided for the twelve months ended December 31, 2022.

Biomedical Advanced Research and Development Authority (BARDA)

In February 2011, we entered into a contract with BARDA for the advanced development of TEMBEXA as a medical countermeasure in the event of a smallpox release. Under the contract, we received $72.5 million in expense reimbursement and $4.6 million in fees over the performance of one base segment and four option segments. Exercise of each option segment was solely at the discretion of BARDA. The Company assessed the services in accordance with the authoritative guidance and concluded that there was a potential of five separate contracts (one base segment and four option segments) within this agreement, each of which had a single performance obligation. All option segments (one through four) were exercised, as well as the base segment. The transaction price for each segment, based on the transaction price as defined in each segment contract, was allocated to the single performance obligation for each contract. The transaction price was recognized over time by measuring the progress toward complete satisfaction of the performance obligation. For reimbursable expenses, this occurred as qualifying research activities were conducted based on invoices from company vendors. For the fixed fee, the progress toward complete satisfaction was estimated based on the costs incurred to date relative to the total estimated costs per the terms of each contract. The Company typically invoiced BARDA monthly as costs were incurred. Any amounts received in advance of performance were recorded as deferred revenue until earned. The base segment and first option segment were completed prior to adoption of ASC 606. The second and third option segments were completed on August 20, 2020. The fourth option segment was completed on September 1, 2021 and the contract has expired in accordance with its terms. Under the BARDA contract, we recognized revenue of $1.6 million and $5.3 million during the twelve months ended, December 31, 2021 and 2020, respectively.

Grant Revenue

Grant revenue under cost-plus-fixed-fee grants from the federal government and private foundations is recognized as allowable costs are incurred and fees are earned. As a result of its acquisition of Oncoceutics, Inc. (Oncoceutics), the Company became the beneficiary of two federal grant programs and two grant programs with private foundations, of which the federal grant programs ended in the third quarter of 2021. At December 31, 2022, the Company had a deferred revenue balance of $0.2 million related to these grants. Additionally, for the twelve months ended months ended December 31, 2022, the Company recognized $0.5 million of grant revenue related to these grants.

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, 2022, 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.

Inventories

The Company considers regulatory approval of product candidates to be uncertain and product manufactured prior to regulatory approval may not be sold unless regulatory approval is obtained. As such, the manufacturing costs for product candidates incurred prior to regulatory approval are not capitalized as inventory but are expensed as research and development costs. The Company begins capitalization of these inventory related costs once regulatory approval is obtained. The Company primarily uses actual costs to determine its cost basis for inventories.

Prior to the Asset Sale, the Company's inventory consisted of TEMBEXA, which was being manufactured for the treatment of smallpox for potential delivery to the Strategic National Stockpile (SNS) for the U.S. government and to other government agencies. TEMBEXA was approved by the FDA on June 4, 2021, at which time the Company began to capitalize inventory costs associated with TEMBEXA. Prior to FDA approval of TEMBEXA, all costs related to the manufacturing of TEMBEXA were charged to research and development expense in the period incurred as there was no alternative future use.

The Company valued its inventories at the lower of cost or estimated net realizable value. The Company determined the cost of its inventories, which included amounts related to materials, manufacturing costs, shipping and handling costs on a first-in, first-out (FIFO) basis. Work-in-process included all inventory costs prior to packaging and labelling, including raw material, active product ingredient, and drug product. Finished goods included packaged and labelled products. Title to all inventory was transferred to Emergent upon the close of the Asset Sale (as defined above).

Employee Retention Credit

Under the provisions of the extension of the Coronavirus Aid, Relief, and Economic Security Act (the "CARES Act") passed by the United States Congress and signed by the President, the Company is eligible for a refundable employee retention credit subject to certain criteria. The Company recognized a $2.0 million employee retention credit during the twelve months ended December 31, 2022 related to labor costs recognized during 2020 and 2021, which is recorded in prepaid expenses and other current assets. For the twelve months ended December 31, 2022, $1.5 million is recorded as a reduction to research and development expenses and $0.5 million is recorded as a reduction to general and administrative expenses. The Company has filed for refunds of the employee retention credits and as of the date of this Annual Report on Form 10-K, it has received $27,000 of refunds and cannot reasonably estimate when it will receive any or all of the remaining refunds.

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,		
	2022	2021	2020
Income Statement Classification:			
Research and development expense	$ 8,267	$ 6,611	$ 2,969
General and administrative expense	7,018	5,649	2,599
Total stock-based compensation expense	$ 15,285	$ 12,260	$ 5,568

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, 2022, 2021, and 2020 are set forth below:

Stock Options

	Years Ended December 31,		
	2022	2021	2020
Expected volatility	74.27 %	95.84 %	93.24 %
Expected term (in years)	6.0	6.0	6.0
Weighted-average risk-free interest rate	1.91 %	0.71 %	1.24 %
Expected dividend yield	— %	— %	— %
Weighted-average fair value per option	$ 3.33	$ 6.67	$ 1.78

Employee Stock Purchase Plan

	Years Ended December 31,		
	2022	2021	2020
Expected volatility	104.88 %	97.54 %	75.39 %
Expected term (in years)	1.28	0.71	1.28
Weighted-average risk-free interest rate	2.63 %	0.25 %	0.37 %
Expected dividend yield	— %	— %	— %
Weighted-average option value per share	$ 1.97	$ 6.55	$ 0.93

Utilization of Net Operating Loss Carryforwards

As of December 31, 2022, we had net operating loss carryforwards for federal and state tax purposes of approximately $394.8 million and $394.4 million, respectively. As of December 31, 2021, we had net operating loss carryforwards for federal and state tax purposes of approximately $637.9 million and $455.4 million, respectively. In addition, we had tax credit carryforwards for federal tax purposes of approximately $26.6 million as of December 31, 2022. Of the $26.6 million, $0.1 million expired 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 change, by value, in our equity ownership over a three-year period, 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 may experience ownership changes in the future as a result of subsequent shifts in our stock ownership, some of which are outside our control. Furthermore, under the Tax Act, as amended by the CARES Act, federal net operating losses incurred in tax years beginning after December 31, 2017, 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 or the CARES 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, 2022 and December 31, 2021

The following table summarizes our results of operations for the years ended December 31, 2022 and December 31, 2021, together with the changes in those items in dollars and percentages (in thousands, except percentages):

	Years Ended December 31,		Dollar Change	% Change
	2022	2021	Increase/(Decrease)	
Revenues:				
Procurement revenue	$ 31,971	$ —	$ 31,971	*
Contract and grant revenue	942	1,928	(986)	(51.1)%
Licensing revenue	536	51	485	951.0
Royalty revenue	375	—	375	*
Total revenues	33,824	1,979	31,845	1,609.1 %
Cost of goods sold	447	—	447	*
Gross Profit	33,377	1,979	31,398	1,586.6 %
Operating expenses:				
Research and development	71,631	73,817	(2,186)	(3.0)%
General and administrative	22,132	18,672	3,460	18.5 %
Acquired in-process research and development	—	82,890	(82,890)	(100.0)%
Total operating expenses	93,763	175,379	(81,616)	(46.5)%
Loss from operations	(60,386)	(173,400)	113,014	(65.2)%
Other income (loss):				
Interest income and other, net	2,919	164	2,755	1,679.9 %
Gain on sale of business, net	229,670	—	229,670	*
Income (loss) before income taxes	172,203	(173,236)	345,439	(199.4)%
Income tax expense	36	—	36	*
Net income (loss)	$ 172,167	$ (173,236)	$ 345,403	(199.4)%

***** Not meaningful or not calculable

Contract, Licensing, Procurement and Royalty Revenue

For the year ended December 31, 2022, total revenues increased to $33.8 million compared to $2.0 million for the year ended December 31, 2021. The increase of $31.8 million, or 1,609.1%, was primarily related to the deliveries under the international TEMBEXA procurement agreements.

Cost of Goods Sold

For the year ended December 31, 2022, cost of goods sold increased to $0.4 million and for the year ended December 31, 2021 we did not record any cost of goods sold. The increase of $0.4 million is attributable to the international TEMBEXA procurement deliveries and the write-off of inventory deemed nonsalable.

Research and Development Expenses

For the year ended December 31, 2022, our research and development expenses decreased to $71.6 million compared to $73.8 million for the year ended December 31, 2021. The decrease of $2.2 million, or 3.0%, was primarily related to the following:

- an increase of $20.3 million related to ONC201 research and development expenses and start-up expenses related to the ACTION Phase 3 study of ONC201 in patients who harbor the H3 K27M-mutation;
- an increase of $3.0 million in compensation expenses, of which $1.7 million is related to non-cash stock compensation expense and $0.8 million relates to the accrual of severance related expenses;

- an increase of $2.5 million for the development of our other pipeline products, ONC206, ONC212, and CMX521; offset by
- a decrease of $20.0 million related to the success milestone payment to Oncoceutics shareholders upon the achievement of a 20% ORR by BICR of ONC201 paid out in 2021;
- a decrease of $4.8 million in DSTAT development costs related to the discontinuation of the DSTAT program; and
- a decrease of $2.5 million in TEMBEXA expense.

General and Administrative Expenses

For the year ended December 31, 2022, our general and administrative expenses increased to $22.1 million compared to $18.7 million for the year ended December 31, 2021. The increase of $3.5 million, or 18.5%, was primarily related to the following:

- an increase of $1.7 million in compensation expenses, of which $1.4 million is related to non-cash stock compensation expense; and
- an increase of $1.8 million primarily related to legal, and consulting expenses, related to the TEMBEXA transactions.

Acquired In-process Research and Development Expenses

In connection with our acquisition of Oncoceutics in January 2021, we recorded a total of $82.9 million of acquired in-process research and development expenses for the year ended December 31, 2021, which included $82.6 million of in-process research and development assets expensed and $0.3 million of transaction costs. We paid consideration including an upfront payment of $25.0 million to Oncoceutics, $43.4 million related to the fair value of the 8,723,769 shares of common stock issued to Oncoceutics, and a $14.0 million promissory note due on the one-year anniversary of the acquisition.

Interest Income and Other, Net

For the year ended December 31, 2022, our interest income and other, net was $2.9 million compared to interest income of $0.2 million for the year ended December 31, 2021. The increase of $2.8 million was largely attributable to an increase in interest rates on the increased cash balance from proceeds received during 2022 related to the Asset Sale with Emergent and international TEMBEXA procurement agreements.

Gain on Sale of Business, Net

For the year ended December 31, 2022, we recorded a net gain of $229.7 million related to the sale of the exclusive worldwide rights to brincidofovir, including TEMBEXA and specified related assets to Emergent.

Comparison of the Years ended December 31, 2021 and December 31, 2020

The following table summarizes our results of operations for the years ended December 31, 2021 and December 31, 2020, together with the changes in those items in dollars and percentages (in thousands, except for percentages):

	Years Ended December 31,		Dollar Change	% Change
	2021	2020	Increase/(Decrease)	
Revenues:				
Contract and grant revenue	$ 1,928	$ 5,274	$ (3,346)	(63.4)%
Licensing revenue	51	98	(47)	(48.0)%
Total revenues	1,979	5,372	(3,393)	(63.2)%
Operating expenses:				
Research and development	73,817	36,232	37,585	103.7 %
General and administrative	18,672	13,656	5,016	36.7 %
Acquired in-process research and development	82,890	—	82,890	*
Total operating expenses	175,379	49,888	125,491	251.5 %
Loss from operations	(173,400)	(44,516)	(128,884)	289.5 %
Other income (loss):				
Interest income and other, net	164	994	(830)	(83.5)%
Net income (loss)	$ (173,236)	$ (43,522)	$ (129,714)	298.0 %

Revenue

For the year ended December 31, 2021, contract and licensing revenue decreased to $2.0 million compared to $5.4 million for the year ended December 31, 2020. The decrease of $3.4 million, or 63.2%, was related to a decrease in reimbursable expenses associated with our development contract with BARDA upon receiving FDA approval for TEMBEXA.

Research and Development Expenses

For the year ended December 31, 2021, our research and development expenses increased to $73.8 million compared to $36.2 million for the year ended December 31, 2020. The increase of $37.6 million, or 103.7%, was primarily related to the following:

- an increase of $20 million related to the success milestone payment to Oncoceutics shareholders upon achievement of a 20% ORR by BICR of ONC01 in recurrent H3 K27M-mutant glioma patients;
- an increase of $14.2 million primarily related to drug manufacturing and clinical trial support of ONC201;
- an increase of $9.5 million in compensation expenses, of which $3.6 million is related to non-cash stock compensation expenses; offset by
- a decrease of $4.5 million in brincidofovir smallpox program expenses with the approval of TEMBEXA in June 2021; and
- a decrease of $2.0 million in DSTAT development expenses primarily related to the conclusion of animal studies.

General and Administrative Expenses

For the year ended December 31, 2021, our general and administrative expenses increased to $18.7 million compared to $13.7 million for the year ended December 31, 2020. The increase of $5.0 million, or 36.7%, was primarily related to the following:

- an increase of $3.6 million in compensation expenses, of which $3.1 million is related to non-cash stock compensation expense; and
- an increase of $1.2 million in consulting, legal, and operational expenses with the growth of the company’s infrastructure.

Acquired In-process Research and Development Expenses

In connection with our acquisition of Oncoceutics in January 2021, we recorded a total of $82.9 million of acquired in-process research and development expenses for the year ended December 31, 2021, which included $82.6 million of in-process research and development assets expensed and $0.3 million of transaction costs. We paid consideration including an upfront payment of $25.0 million to Oncoceutics, $43.4 million related to the fair value of the 8,723,769 shares of common stock issued to Oncoceutics, and a $14.0 million promissory note due on the one-year anniversary of the acquisition.

Interest Income and Other, Net

For the year ended December 31, 2021, our interest income and other, net was $0.2 million compared to interest income of $1.0 million for the year ended December 31, 2020. The decrease of $0.8 million was largely attributable to amortization of our investment balances offsetting interest earned.

LIQUIDITY AND CAPITAL RESOURCES

As of December 31, 2022, we had capital available to fund operations of approximately $266.0 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, 2022, we had an accumulated deficit of $713.4 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 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. As of December 31, 2022, 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 our common stock. The price to the public in this offering was $8.50 per share, and the Underwriters agreed to purchase the Shares from us pursuant to the Underwriting Agreement at a price of $7.99 per share. The net proceeds to us from this offering were approximately $107.8 million, including the exercise in full of the Underwriters' option to purchase additional shares, after deducting underwriting discounts and commissions and estimated offering expenses payable by us. The offering closed on January 25, 2021.

On May 6, 2021, we filed an automatic shelf registration statement on Form S-3 with the SEC (the 2021 Shelf Registration Statement), which was subsequently amended in March 2022 to convert it to a non-automatic shelf registration statement that we are eligible to use. The amendment to the 2021 Shelf Registration Statement to convert to a non-automatic shelf registration statement. This registration statement enables us to offer for sale, from time to time, in one or more offerings, up to $250 million in the aggregate, of common stock, preferred stock, debt securities, warrants, rights and/or units, and will remain in effect for up to three years from the date it initially became effective. As of December 31, 2022, no sales have been made under the 2021 Shelf Registration Statement.

On January 31, 2022, we entered into a Loan and Security Agreement (the Loan Agreement) with Silicon Valley Bank. The Loan Agreement provides for a four-year secured revolving loan facility (the Credit Facility) in an aggregate principal amount of up to $50.0 million. Proceeds from the Credit Facility may be used for working capital and general corporate purposes. We have no obligation to draw down any amount under the Credit Facility, and have not drawn down any amount as of December 31, 2022. In September 2022, in connection with the Asset Sale, Silicon Valley Bank and the Company agreed to suspend the availability of future advances under the Loan Agreement until such time the parties mutually agree to amend the Loan Agreement to, among other things, adjust the borrowing base and reset the covenants.

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:	**2022**	**2021**	**2020**
Net cash used in operating activities	$ (46,867)	$ (99,930)	$ (36,038)
Net cash provided by investing activities	70,037	(44,091)	64,713
Net cash provided by financing activities	(12,725)	112,429	1,413
Net increase (decrease) in cash and cash equivalents	$ 10,445	$ (31,592)	$ 30,088

Operating Activities

Net cash used in operating activities of $46.9 million for the year ended December 31, 2022 was primarily the result of our net income of $172.2 million offset by the change in operating asset and liabilities and add-back of non-cash adjustments. The change in operating assets and liabilities includes an increase in prepaid expenses and other assets of $5.4 million, an increase in inventories of $2.5 million and an increase in accounts receivable of $1.0 million, offset by an decrease in accounts payable and accrued liabilities of $5.5 million. Non-cash adjustments included an adjustment of $229.7 million for the gain on the sale of TEMBEXA and $1.6 million of amortization of discount/premium on investments, offset by the add-back of $15.3 million for stock-based compensation, $0.2 million for amortization of debt issuance costs and $0.1 million of depreciation of property and equipment.

Net cash used in operating activities of $99.9 million for the year ended December 31, 2021 was primarily the result of our $173.2 million net loss offset by the change in operating assets and liabilities and the add-back of non-cash expenses. The change in operating assets and liabilities includes an increase in accounts payable and accrued liabilities of $7.1 million and a decrease of $0.3 million in accounts receivable offset by an increase in inventories of $2.8 million and an increase in prepaid expenses and other assets of $2.4 million. Non-cash expenses included add-backs of $43.4 million for the fair value of common stock issued in relation to the Oncoceutics acquisition, $14.0 million for the note payable due on the one-year anniversary of the Oncoceutics acquisition, $12.3 million for stock-based compensation, $0.8 million of amortization of discount/premium on investments, $0.3 million for lease-related amortization and $0.2 million of depreciation of property and equipment.

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 assets 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.

Investing Activities

Net cash provided by investing activities of $70.0 million during the year ended December 31, 2022 was primarily the result of $234.0 million of proceeds from the sale of TEMBEXA, the maturity of $69.5 million in short-term investments and the sale of $7.7 million of short-term investments, offset by purchases of $183.2 million of short-term investments and the purchase of $57.8 million of long-term investments. Net cash used by investing activities of $44.1 million during the year ended December 31, 2021 was primarily the result of purchases of short-term and long-term investments, offset by maturities and sales of short-term investments. 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.

Financing Activities

Net cash used by financing activities of $12.7 million for the year ended December 31, 2022 was primarily the result of the $14.0 million payment of the note payable related to the Oncoceutics acquisition and the payment of $0.2 million of debt issuance costs, partially offset by $1.5 million from the exercise of stock options and purchases under the ESPP. Net cash provided by financing activities of $112.4 million for the year ended December 31, 2021 was primarily the result of $107.8 million in proceeds from the issuance of common stock and $4.6 million from the exercise of stock options and purchases under

the ESPP. 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.

Future Funding Requirements

To date, we have generated modest, non-recurring revenue from product sales. Prior to 2022, all of our revenue to date has been derived from government grants and a contract and the receipt of up-front proceeds under our collaboration and license agreements.

To date, we have generated modest, non-recurring revenue from product sales. We do not know when, or if, we will generate any additional revenue from product sales or receive royalties from our partners' product sales. We do not expect to generate significant revenue from product sales unless and until we commercialize ONC201 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.

MATERIAL CASH REQUIREMENTS

Leases. See Note 4 of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K for information, including the future operating lease minimum payments.

In addition to the amounts set forth 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, 2022, we were unable to estimate the timing or likelihood of achieving the milestones or making future product sales. In connection with the development and commercialization of ONC201, ONC206 and ONC212, in addition to royalties on product sales, we could be required to pay former Oncoceutics securityholders up to an aggregate of $340.0 million in remaining milestone payments, assuming the achievement of all remaining applicable milestone events under the merger 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. 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.

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, 2022 or 2021.

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, 2022 and 2021, the related consolidated statements of operations and comprehensive income (loss), stockholders' equity (deficit) and cash flows for each of the three years in the period ended December 31, 2022, 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, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022, 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, 2022, 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 March 2, 2023 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 separate opinions on the critical audit matters 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 $6.7 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, NC
March 2, 2023

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, 2022, 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, 2022, 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, 2022 and 2021, the related consolidated statements of operations and comprehensive income (loss), stockholders' equity (deficit) and cash flows for each of the three years in the period ended December 31, 2022, and the related notes and our report dated March 2, 2023 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
March 2, 2023

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

	December 31,	
	2022	**2021**
ASSETS		
Current assets:		
Cash and cash equivalents	$ 25,842	$ 15,397
Short-term investments, available-for-sale	191,492	72,970
Accounts receivable	1,040	—
Inventories	—	2,760
Prepaid expenses and other current assets	9,764	4,678
Total current assets	228,138	95,805
Long-term investments	48,626	2,022
Property and equipment, net of accumulated depreciation	227	253
Operating lease right-of-use assets	1,964	2,404
Other long-term assets	386	56
Total assets	$ 279,341	$ 100,540
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 3,034	$ 2,788
Accrued liabilities	17,381	13,108
Note payable	—	14,000
Total current liabilities	20,415	29,896
Loan Fees	250	—
Lease-related obligations	1,819	2,392
Total liabilities	22,484	32,288
Stockholders' equity:		
Preferred stock, $0.001 par value, 10,000,000 shares authorized at December 31, 2022 and 2021; no shares issued and outstanding as of December 31, 2022 and 2021	—	—
Common stock, $0.001 par value; 200,000,000 shares authorized at December 31, 2022 and 2021; 88,054,127 and 86,884,266 shares issued and outstanding at December 31, 2022 and 2021, respectively	88	87
Additional paid-in capital	970,535	953,782
Accumulated other comprehensive loss, net	(337)	(21)
Accumulated deficit	(713,429)	(885,596)
Total stockholders' equity	256,857	68,252
Total liabilities and stockholders' equity	$ 279,341	$ 100,540

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

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

	Years Ended December 31,		
	2022	**2021**	**2020**
Revenues:			
Procurement revenue	$ 31,971	$ —	$ —
Contract and grant revenue	942	1,928	5,274
Licensing revenue	536	51	98
Royalty revenue	375	—	—
Total revenues	33,824	1,979	5,372
Cost of goods sold	447	—	—
Gross Profit	33,377	1,979	5,372
Operating expenses:			
Research and development	71,631	73,817	36,232
General and administrative	22,132	18,672	13,656
Acquired in-process research and development	—	82,890	—
Total operating expenses	93,763	175,379	49,888
Loss from operations	(60,386)	(173,400)	(44,516)
Other income (loss):			
Interest income and other, net	2,919	164	994
Gain on sale of business, net	229,670	—	—
Income (loss) before income taxes	172,203	(173,236)	(43,522)
Income tax expense	36	—	—
Net income (loss)	172,167	(173,236)	(43,522)
Other comprehensive income (loss):			
Unrealized loss on debt investments, net	(316)	(21)	(35)
Comprehensive income (loss)	$ 171,851	$ (173,257)	$ (43,557)
Per share information:			
Net income (loss), basic	$ 1.97	$ (2.04)	$ (0.70)
Net income (loss), diluted	$ 1.94	$ (2.04)	$ (0.70)
Weighted-average shares outstanding, basic	87,555,110	84,930,255	62,183,947
Weighted-average shares outstanding, diluted	88,776,147	84,930,255	62,183,947

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, 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
Share-based compensation	—	—	12,260	—	—	$ 12,260
Exercise of stock options	841,775	1	3,830	—	—	$ 3,831
Employee stock purchase plan purchases	542,931	1	754	—	—	$ 755
RSU stock issuance	430,002	—	—	—	—	$ —
Issuance of common stock related to asset acquisition	8,723,769	9	43,436	—	—	$ 43,445
Issuance of common stock, net of issuance costs	13,529,750	13	107,829	—	—	$ 107,842
Comprehensive loss:						
Unrealized loss on investments, net	—	—	—	(21)	—	$ (21)
Net loss	—	—	—	—	(173,236)	$ (173,236)
Total comprehensive loss						(173,257)
Balance, December 31, 2021	86,884,266	$ 87	$ 953,782	$ (21)	$ (885,596)	$ 68,252
Share-based compensation	—	—	15,285	—	—	$ 15,285
Exercise of stock options	271,079	—	608	—	—	$ 608
Employee stock purchase plan purchases	535,255	1	860	—	—	$ 861
RSU stock issuance	363,527	—	—	—	—	$ —
Comprehensive income (loss):						
Unrealized loss on investments, net	—	—	—	(316)	—	$ (316)
Net income	—	—	—	—	172,167	$ 172,167
Total comprehensive income						171,851
Balance, December 31, 2022	88,054,127	$ 88	$ 970,535	$ (337)	$ (713,429)	$ 256,857

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,		
	2022	**2021**	**2020**
Cash flows from operating activities:			
Net income (loss)	$ 172,167	$ (173,236)	$ (43,522)
Adjustments to reconcile net income (loss) to net cash used in operating activities:			
Depreciation of property and equipment	98	167	402
Amortization of debt issuance costs	233	—	—
Amortization of discount/premium on investments	(1,566)	846	(190)
Share-based compensation	15,285	12,260	5,568
Fair value of common stock issued related to asset acquisition	—	43,445	—
Note payable related to asset acquisition	—	14,000	—
Gain on sale of TEMBEXA	(229,670)	—	—
(Gain) on disposition of assets	—	—	(10)
(Gain) on sale of investments	(1)	(2)	(4)
Lease-related amortization	9	301	(14)
Changes in operating assets and liabilities:			
Accounts receivable	(1,040)	340	893
Inventories	(2,467)	(2,760)	—
Prepaid expenses and other assets	(5,419)	(2,352)	1,025
Accounts payable and accrued liabilities	5,504	7,061	(186)
Net cash used in operating activities	(46,867)	(99,930)	(36,038)
Cash flows from investing activities:			
Purchases of property and equipment	(71)	(207)	(58)
Purchases of short-term investments	(183,245)	(105,355)	(73,978)
Purchases of long-term investments	(57,810)	(9,594)	—
Proceeds from sales of short-term investments	7,699	4,207	17,287
Proceeds from maturities of short-term investments	69,480	66,858	121,452
Proceeds from sale of TEMBEXA	233,984	—	—
Proceeds from sale of property and equipment	—	—	10
Net cash provided by (used in) investing activities	70,037	(44,091)	64,713
Cash flows from financing activities:			
Proceeds from exercise of stock options	608	3,831	987
Proceeds from employee stock purchase plan	860	755	426
Proceeds from issuance of common stock, net of commissions	—	107,843	—
Payments of deferred offering costs	(193)	—	—
Payment of note payable	(14,000)	—	—
Net cash (used in) provided by financing activities	(12,725)	112,429	1,413
Net increase (decrease) in cash and cash equivalents	10,445	(31,592)	30,088
Cash and cash equivalents:			
Beginning of period	15,397	46,989	16,901
End of period	$ 25,842	$ 15,397	$ 46,989
Supplemental disclosure of cash flow information			
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 biopharmaceutical company whose mission it is to develop medicines that meaningfully improve and extend the lives of patients facing deadly diseases.

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.

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.

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, 2022, approximately $1,000 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, and long-term investments. 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

Accounts receivable at December 31, 2022 consisted of royalties earned on sales of TEMBEXA by Emergent and amounts billed under the Company's grant agreements and transition services agreement with Emergent. Receivables 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.

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, 2022			
	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	$ 17,826	$ 17,826	$ —	$ —
Commercial paper	4,998	—	4,998	—
Total cash equivalents	22,824	17,826	4,998	—
Short-term investments				
U.S. Treasury securities	38,094	25,271	12,823	—
Commercial paper	127,517	—	127,517	—
Corporate bonds	25,881	—	25,881	—
Total short-term investments	191,492	25,271	166,221	—
Long-term investments				
U.S. Treasury securities	48,626	11,685	36,941	—
Total long-term investments	48,626	11,685	36,941	—
Total assets	$ 262,942	$ 54,782	$ 208,160	$ —

	Fair Value Measurements December 31, 2021			
	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	$ 11,841	$ 11,841	$ —	$ —
Total cash equivalents	11,841	11,841	—	—
Short-term investments				
U.S. Treasury securities	7,517	2,523	4,994	—
Commercial paper	34,887	—	34,887	—
Corporate bonds	30,566	—	30,566	—
Total short-term investments	72,970	2,523	70,447	—
Long-term investments				
U.S. Treasury securities	2,022	2,022	—	—
Total long-term investments	2,022	2,022	—	—
Total assets	$ 86,833	$ 16,386	$ 70,447	$ —

Inventories

The Company considers regulatory approval of product candidates to be uncertain and product manufactured prior to regulatory approval may not be sold unless regulatory approval is obtained. As such, the manufacturing costs for product candidates incurred prior to regulatory approval are not capitalized as inventory but are expensed as research and development costs. The Company begins capitalization of these inventory related costs once regulatory approval is obtained. The Company primarily uses actual costs to determine its cost basis for inventories.

On May 15, 2022, we entered into an Asset Purchase Agreement (the Asset Purchase Agreement) with an affiliate of Emergent BioSolutions Inc. (Emergent BioSolutions) for the sale of our exclusive worldwide rights to brincidofovir, including

TEMBEXA® and specified related assets (the Asset Sale). On September 26, 2022, we closed the Asset Sale with Emergent Biodefense Operations Lansing LLC (Emergent), an affiliate of Emergent BioSolutions.

Prior to the sale of TEMBEXA to Emergent, the Company's inventory consisted of TEMBEXA, which was being manufactured for the treatment of smallpox for potential delivery to the Strategic National Stockpile (SNS) for the U.S. government and to other government agencies. TEMBEXA was approved by the FDA on June 4, 2021, at which time the Company began to capitalize inventory costs associated with TEMBEXA. Prior to FDA approval of TEMBEXA, all costs related to the manufacturing of TEMBEXA were charged to research and development expense in the period incurred as there was no alternative future use.

The Company valued its inventories at the lower of cost or estimated net realizable value. The Company determined the cost of its inventories, which included amounts related to materials, manufacturing costs, shipping and handling costs on a first-in, first-out (FIFO) basis. Work-in-process included all inventory costs prior to packaging and labelling, including raw material, active product ingredient, and drug product. Finished goods included packaged and labelled products. Title to all inventory was transferred to Emergent upon the close of the Asset Sale (as defined below).

Prepaid Expenses and Other Current Assets

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

	December 31,	
	2022	**2021**
Prepaid research and development expenses	$ 3,399	$ 1,726
Interest receivable	643	348
Prepaid insurance	564	450
Other prepaid expenses and current assets	5,158	2,154
Total prepaid expenses and other current assets	$ 9,764	$ 4,678

Employee Retention Credit

Under the provisions of the extension of the Coronavirus Aid, Relief, and Economic Security Act (the "CARES Act") passed by the United States Congress and signed by the President, the Company is eligible for a refundable employee retention credit subject to certain criteria. The Company recognized a $2.0 million employee retention credit during twelve months ended December 31, 2022 related to labor costs recognized during 2020 and 2021, which is recorded in prepaid expenses and other current assets. For the twelve months ended December 31, 2022, $1.5 million is recorded as a reduction to research and development expenses and $0.5 million is recorded as a reduction to general and administrative expenses. The Company has filed for refunds of the employee retention credits and as of the date of this Annual Report on Form 10-K, it has received $27,000 of refunds and cannot reasonably estimate when it will receive any or all of the remaining refunds.

Deferred Loan Costs

On January 31, 2022 (the Effective Date), the Company entered into a Loan and Security Agreement (the Loan Agreement), by and between the Company, as borrower, and Silicon Valley Bank, as the lender (the Lender). The Loan Agreement provides for a four-year secured revolving loan facility (the Credit Facility) in an aggregate principal amount of up to $50.0 million. Proceeds from the Credit Facility may be used for working capital and general corporate purposes. The Company has no obligation to draw down any amount under the Credit Facility, and has not drawn down any amount as of December 31, 2022.

In September 2022, in connection with the Asset Sale, Silicon Valley Bank and the Company agreed to suspend the availability of future advances under the Loan Agreement until such time the parties mutually agree to amend the Loan Agreement to, among other things, adjust the borrowing base and reset the covenants.

Borrowings under the Credit Facility accrue interest at a floating per annum rate of the greater of (i) 1.50% above the Prime Rate (as defined below) and (ii) 4.75%. Prime Rate is defined as the rate of interest per annum published in The Wall Street Journal or any successor publication thereto as the "prime rate". If such rate of interest from The Wall Street Journal becomes unavailable, the "Prime Rate" shall mean the rate of interest per annum announced by the Lender as its prime rate in effect. In each case, in the event such prime rate is less than zero, such rate shall be deemed to be zero for purposes of the Loan Agreement. The Company must also pay an unused line fee equal to 0.25% per annum on the unused portion of the Credit

Facility, payable quarterly in arrears. Upon the termination of the Loan Agreement for any reason prior to the Maturity Date, the Company will be required to pay to the Lender an early termination fee of $0.5 million. The Loan Agreement also requires the Company to pay the Lender a non-refundable commitment fee of $0.5 million, payable in four equal installments beginning on the Effective Date and each anniversary of the Effective Date thereafter until January 31, 2025. As of December 31, 2022, the Company has recorded current deferred loan costs of $0.1 million in prepaid expenses and other current assets and non-current deferred loan costs of $0.3 million in other long-term assets on the Consolidated Balance Sheets. As of December 31, 2022, the Company has recorded a current loan fee liability of $0.2 million in accrued liabilities and a non-current loan fee liability of $0.3 million in loan fees on the Consolidated Balance Sheets.

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, 2022 and 2021, no such write-downs have occurred.

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,	
	2022	**2021**
Accrued compensation	$ 6,438	$ 5,491
Accrued research and development expenses	6,691	4,642
Other accrued liabilities	4,252	2,975
Total accrued liabilities	$ 17,381	$ 13,108

Revenue Recognition

Policy

The Company's revenues generally consist of (i) procurement revenue - revenue related to sales of TEMBEXA prior to the Asset Sale (ii) contract and grant revenue - revenue generated under federal and private foundation grants and contracts, (iii) licensing revenue - revenue related to non-refundable upfront fees, royalties and milestone payments earned under license agreements, and (iv) royalty revenue - revenue related to sales of TEMBEXA made by Emergent after the Asset Sale. 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.

TEMBEXA Procurement Agreements

In June 2022, the Company entered into the Supply Agreement and the PHAC Contract, pursuant to which the Company was responsible for supplying TEMBEXA (brincidofovir) treatment courses for use outside of the United States. There are no material performance obligations outside of delivery in the agreements, therefore revenue related to these procurement agreements was recognized when the delivery performance obligation was satisfied. Revenue was recognized based on price per treatment course as outlined in the agreements. For the twelve months ended December 31, 2022, the Company recognized $32.0 million of procurement revenue related to these agreements.

The PHAC Contract was assigned to Emergent in November 2022. The remaining deliveries of treatment courses were delivered by Emergent and are subject to the royalty terms of the Asset Purchase Agreement applicable to gross profits outside the United States. The Company recognized approximately $0.4 million of royalty revenue in the twelve months ended December 31, 2022.

Emergent Biodefense Operations Lansing LLC

On September 26, 2022, the Company completed the Asset Sale to Emergent of the Company's exclusive worldwide rights to brincidofovir, including TEMBEXA® and specified related assets (the Asset Sale). Emergent paid the Company an upfront cash payment of approximately $238 million upon the closing of the Asset Sale. In addition, pursuant to the Asset Purchase Agreement, the Company is eligible to receive from Emergent: (i) up to an aggregate of approximately $124 million in milestone payments payable upon the exercise of the options under the BARDA Agreement for the delivery of up to 1.7 million treatment courses of tablet and suspension formulations of TEMBEXA to the U.S. government; (ii) royalty payments equal to 15% of the gross profits from the sales of TEMBEXA made outside of the United States; (iii) royalty payments equal to 20% of the gross profits from the sales of TEMBEXA made in the United States in excess of 1.7 million treatment courses; and (iv) up to an additional $12.5 million upon the achievement of certain other developmental milestones. The effects of recording certain adjustments associated with contingent consideration related to TEMBEXA have been excluded as the Company has made a policy election to account for these amounts when the contingency has been resolved in accordance with Accounting Standards Codification 450, *Contingencies*.

The Company continues to provide operational support to Emergent in furtherance of its obligations under both the Asset Purchase Agreement (and related agreements) and the BARDA Agreement. The BARDA Agreement was novated to Emergent in December 2022. Under the Asset Purchase Agreement, the Company recognized approximately $0.5 million of contract revenue for support provided for the twelve months ended December 31, 2022.

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 received $72.5 million in expense reimbursement and $4.6 million in fees over the performance of 1 base segment and 4 option segments. Exercise of each option segment was solely at the discretion of BARDA. The Company assessed the services in accordance with the authoritative guidance and concluded that there was a potential of 5 separate contracts (1 base segment and four option segments) were exercised, as well as the base segment. The transaction price for each segment, based on the transaction price as defined in each segment contract, was allocated to the single performance obligation for each contract. The transaction price was recognized over time by measuring the progress toward complete satisfaction of the performance obligation. For reimbursable expenses, this occurred as qualifying research activities were conducted based on invoices from company vendors. For the fixed fee, the progress toward complete satisfaction was estimated based on the costs incurred to date relative to the total estimated costs per

the terms of each contract. The Company typically invoiced BARDA monthly as costs were incurred. Any amounts received in advance of performance were recorded as deferred revenue until earned. The base segment and first option segment were completed prior to adoption of ASC 606. The second and third option segments were completed on August 20, 2020. The fourth option segment was completed on September 1, 2021 and the contract has expired in accordance with its terms. Under the BARDA contract, we recognized contract revenue of $1.6 million and $5.3 million during the twelve months ended, December 31, 2021 and 2020, respectively.

Grant Revenue

Grant revenue under cost-plus-fixed-fee grants from the federal government and private foundations is recognized as allowable costs are incurred and fees are earned. At December 31, 2022, the Company had a deferred revenue balance of $0.2 million related to these grants. Additionally, for the twelve months ended months ended December 31, 2022 and 2021, the Company recognized $0.5 million and $0.4 million, respectively, of grant revenue related to these grants.

Ohara Agreement

In 2019, Oncoceutics, Inc., a Delaware corporation (Oncoceutics) which was subsequently acquired by the Company in January 2021, entered into a license, development and commercialization agreement with Ohara Pharmaceutical Co., Ltd. for ONC201 in Japan. The Company is entitled to receive up to $2.5 million in nonrefundable regulatory milestone payments. The Company is entitled to double-digit tiered royalties based on the aggregate annual net sales of all products, as defined in the agreement, in Japan. For the twelve months ended months ended December 31, 2022 and 2021, the Company recognized approximately $0.5 million and $47,000, respectively, of license revenue related to this agreement.

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, 2022, 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, preclinical 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.

Gain on Sale of Business, Net

Emergent Biodefense Operations Lansing LLC

The previously mentioned sale of TEMBEXA constitutes a significant disposition of a business, however, the Company determined the disposition does not represent a strategic shift, and accordingly, the Company has not accounted for the disposition as a discontinued operation. The Company recorded a $229.7 million net gain on sale of business in other income (loss) on the Consolidated Statement of Operations and Comprehensive Income (Loss) for the twelve months ended December 31, 2022.

Interest Income and Other, Net

Interest income and other, net consists primarily of interest earned on our cash, cash equivalents and short-term and long-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, 2021, and therefore has not recorded any current provision for income taxes. For the year ended December 31, 2022, the Company recorded net income and is expecting a small amount of state income tax expense. As such the Company has recorded a provision for current state 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, 2022, 2021 and 2020, 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, 2022, 2021 and 2020, the Company recognized expenses for matching contributions of $0.5 million, $0.4 million and $0.3 million, respectively.

Basic and Dilutive Net Loss Per Share of Common Stock

Basic net income (loss) per share of common stock is computed by dividing net income (loss) by the weighted-average number of shares of common stock outstanding during the period, excluding the dilutive effects of non-vested restricted stock, stock options, and employee stock purchase plan purchase rights. Diluted net income (loss) per share of common stock is computed by dividing net income (loss) by the sum of the weighted-average number of shares of common stock outstanding during the period plus the potential dilutive effects of 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. For the twelve months ended December 31, 2022, the diluted per-share computations reflect the number of additional common stock outstanding that would have been outstanding if the potentially dilutive common stock had been issued. 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 for the twelve months ended December 31, 2021 and 2020.

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 4,672,859, and 1,162,161, for the years ended December 31, 2021 and 2020, 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, 2022			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Corporate bonds	$ 25,906	$ 4	$ (29)	$ 25,881
Commercial paper	127,657	36	(176)	127,517
U.S. Treasury securities	86,892	7	(179)	86,720
Total investments	$ 240,455	$ 47	$ (384)	$ 240,118

	December 31, 2021			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Corporate bonds	$ 30,571	$ 2	$ (7)	$ 30,566
Commercial paper	34,890	2	(5)	34,887
U.S. Treasury securities	9,552	—	(13)	9,539
Total investments	$ 75,013	$ 4	$ (25)	$ 74,992

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, 2022					
	Less than 12 Months		Greater than 12 Months		Total	
	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
Corporate bonds	$ 22,905	$ (29)	$ —	$ —	$ 22,905	$ (29)
Commercial paper	88,860	(176)	—	—	88,860	(176)
U.S. Treasury securities	67,489	(179)	—	—	67,489	(179)
Total	$ 179,254	$ (384)	$ —	$ —	$ 179,254	$ (384)
Number of securities with unrealized losses		55		—		55

	December 31, 2021					
	Less than 12 Months		Greater than 12 Months		Total	
	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
Corporate bonds	$ 28,362	$ (7)	$ —	$ —	$ 28,362	$ (7)
Commercial paper	8,991	(5)	—	—	8,991	(5)
U.S. Treasury securities	9,539	(13)	—	—	9,539	(13)
Total	$ 46,892	$ (25)	$ —	$ —	$ 46,892	$ (25)
Number of securities with unrealized losses		18		—		18

The following table summarizes the scheduled maturity for the Company's debt investments at December 31, 2022 (in thousands):

	December 31, 2022
Maturing in one year or less	$ 191,492
Maturing after one year through two years	48,626
Total debt investments	$ 240,118

Note 3. Property and Equipment

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

	December 31,	
	2022	2021
Lab equipment	$ 2,299	$ 2,341
Leasehold improvements	1,713	1,713
Computer equipment	817	817
Office furniture and equipment	520	520
Property and equipment	5,349	5,391
Less accumulated depreciation	(5,122)	(5,138)
Property and equipment, net of accumulated depreciation	$ 227	$ 253

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, 2022 was 3.58 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 $0.7 million and $0.7 million for the twelve months ended December 31, 2022 and 2021, 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, 2022, the operating lease liabilities reflect a weighted-average discount rate of 7.89%.

The following table sets forth the operating lease right-of-use assets and liabilities as of December 31, 2022 (in thousands):

Assets		
Operating Lease Right-of-Use Assets	$	1,964
Liabilities		
Operating Lease Short-term Liabilities (recorded within Accrued liabilities)	$	573
Operating Lease Long-term Liabilities (recorded within Lease-related obligations)		1,819
Total Operating Lease Liabilities	$	2,392

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

Years Ending December 31,		**As of December 31, 2022**
2023		736
2024		759
2025		781
2026		467
Total future minimum rental payments	$	2,743
Less amount of lease payments representing interest		351
Total present value of lease payments	$	2,392

For the twelve months ended December 31, 2022 and 2021, the Company made lease payments of approximately $0.6 million and $0.5 million, respectively, which are included in operating cash flows.

Sublease

The Company subleased 3,537 square feet of its office space under a non-cancelable operating lease that expired February 2021. For the twelve months ended December 31, 2021, the Company recognized approximately $12,000 of income in Interest income and other, net on the Consolidated Statement of Operations and Comprehensive Loss. As this lease has terminated, there are no future minimum rentals payments to be received.

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, 2022 and 2021, the Company had recorded a $0.1 million provision for potential refundable amounts.

Note 5. Stockholders' Equity (Deficit)

Common Stock

The Company's common stock consists of 200 million authorized shares at December 31, 2022 and 2021, and 88.1 million and 86.9 million shares issued and outstanding at December 31, 2022 and December 31, 2021, respectively.

Shares Reserved for Future Issuance

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

	December 31,	
	2022	2021
For exercise of outstanding common stock options	15,076,365	11,649,594
For delivery upon vesting of outstanding restricted stock units	920,533	896,222
For future equity awards under the 2013 Equity Incentive Plan	1,466,603	2,076,923
For future purchases under the 2013 Employee Stock Purchase Plan	2,186,097	2,298,817
Total shares of common stock reserved for future issuances	19,649,598	16,921,556

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 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 volatility data to estimate the volatility of our common stock price and 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,		
	2022	2021	2020
Expected volatility	74.27 %	95.84 %	93.24 %
Expected term (in years)	6.0	6.0	6.0
Weighted-average risk-free interest rate	1.91 %	0.71 %	1.24 %
Expected dividend yield	— %	— %	— %
Weighted-average fair value per option	$ 3.33	$ 6.67	$ 1.78

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, 2020	8,913,271	$ 5.28	7.52	
Granted	3,903,750	8.74	—	
Exercised	(909,997)	4.69	—	
Forfeited	(257,432)	15.12	—	
Balance, December 31, 2021	11,649,592	$ 6.27	7.65	
Granted	4,217,275	5.12	—	
Exercised	(271,079)	2.24	—	
Forfeited	(519,423)	6.93	—	
Balance, December 31, 2022	15,076,365	$ 6.00	7.32	$ 64,174
Exercisable at December 31, 2022	9,192,591	$ 6.14	6.59	$ 42,393
Vested or expected to vest at December 31, 2022	14,204,938	$ 6.00	7.25	$ 61,673

As of December 31, 2022, there was approximately $19.6 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 2.39 years.

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

	Years Ended December 31,		
	2022	2021	2020
Weighted-average grant-date fair value per share of options granted	$ 3.33	$ 6.67	$ 1.78
Total intrinsic value of options exercised	$ 114	$ 3,496	$ 355
Total fair value of shares vested	$ 12,721	$ 8,642	$ 4,188

The following table summarizes, at December 31, 2022, 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 2.08	2,418,541	7.42	$ 2.00	1,655,079	$ 2.01
2.09 to 3.13	3,260,545	6.71	2.35	2,707,469	2.34
3.14 to 5.60	1,547,105	5.91	4.64	1,326,771	4.63
5.61 to 7.86	3,918,679	8.98	5.81	1,120,141	6.17
7.87 to 53.74	3,931,495	6.67	12.20	2,383,131	14.14
1.37 to 53.74	15,076,365	7.32	$ 6.00	9,192,591	$ 6.14

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 is intended to qualify as an "employee stock purchase plan" within the meaning of Section 423 of the Code.

The Company has reserved a total of 4,338,936 shares of common stock to be purchased under the ESPP, of which 2,186,097 and 2,298,817 shares remained available for purchase at December 31, 2022 and 2021, 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 535,255 and 542,931 shares of common stock pursuant to the ESPP for the years ended December 31, 2022 and 2021, 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,		
	2022	**2021**	**2020**
Expected volatility	104.88 %	97.54 %	75.39 %
Expected term (in years)	1.28	0.71	1.28
Weighted-average risk-free interest rate	2.63 %	0.25 %	0.37 %
Expected dividend yield	— %	— %	— %
Weighted-average option value per share	$ 1.97	$ 6.55	$ 0.93

As of December 31, 2022, the Company had a liability of $0.3 million representing employees' contributions to the ESPP.

Restricted Stock Units

For the years ended December 31, 2022 and 2021, 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, 2022 and 2021, the Company issued 363,527 and 430,002 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, 2021	896,222	$ 3.98
Granted	451,250	5.24
Share issuance	(363,527)	3.46
Forfeited	(63,412)	3.83
Balance, December 31, 2022	920,533	$ 4.82

The total unrecognized compensation cost related to the non-vested RSUs as of December 31, 2022 was $3.6 million and will be recognized over a weighted average period of approximately 2.31 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,		
	2022	2021	2020
Income Statement Classification:			
Research and development expense	$ 8,267	$ 6,611	$ 2,969
General and administrative expense	7,018	5,649	2,599
Total stock-based compensation expense	$ 15,285	$ 12,260	$ 5,568

Cash received from exercises under all share-based payment arrangements for 2022, 2021 and 2020 was $1.5 million, $4.6 million and $1.4 million, respectively. There was no actual tax benefit realized for the tax deductions from exercises of the share-based payment arrangements during 2022, 2021 or 2020.

In December 2022, related to the Company's announcement of a reduction in workforce, further discussed in Note 10, certain vested stock options were modified to extend their exercise period from 90 days to 12 months. In addition, certain outstanding stock option and RSU grants received accelerated vesting as if the service period of the terminated employee continued for up to an additional 12-month period. Related to this, the Company will record expense totaling approximately $1.0 million ratably from the announcement date through the date of termination with approximately $0.4 million of that total being recognized during the twelve months ended December 31, 2022.

At-The-Market Equity Offering; Shelf Registration Statement

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. We have not sold any shares of our common stock under the Jefferies Sales Agreement.

On May 6, 2021, we filed an automatic shelf registration statement on Form S-3 with the SEC, which was subsequently amended in March 2022 to convert to a non-automatic shelf registration statement. This registration statement enables us to offer for sale, from time to time, in one or more offerings, up to $250 million in the aggregate, of common stock, debt securities, warrants, rights and/or units, and will remain in effect for up to three years from the date it became effective. As of December 31, 2022, no sales have been made under the shelf registration statement.

Public Offering of Common Stock

On January 20, 2021, the Company 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. 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. The net proceeds to the Company from this offering were approximately $107.8 million, including the full exercise of the Underwriters' option to purchase additional shares, after deducting underwriting discounts and commissions and estimated offering expenses payable by the Company. The offering closed on January 25, 2021.

Note 6. Income Taxes

Income tax expense has been recorded for the period ended December 31, 2022. No income tax expense or benefit has been recorded for the years ended December 31, 2021 or 2020. This is due to the establishment of a valuation allowance against the deferred tax assets generated during those periods. At December 31, 2022, 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.

The provision for income tax expense includes the following as of December 31, 2022, 2021, and 2020:

	December 31,		
	2022	2021	2020
Current:			
Federal	$ —	$ —	$ —
State	36	—	—
Total	36	—	—
Deferred:			
Federal	—	—	—
State	—	—	—
Total	—	—	—
Total Tax Expense	$ 36	$ —	$ —

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, 2022, 2021, and 2020 (in thousands, except percentages):

	2022		2021		2020	
	Amount	% of Pretax Earnings	Amount	% of Pretax Earnings	Amount	% of Pretax Earnings
Income tax benefit at statutory rate	$ 36,163	21.0 %	$ (36,379)	21.0 %	$ (9,140)	21.0 %
State income taxes	441	0.2 %	(8,060)	4.7 %	(138)	0.3 %
Research and development credits	(3,312)	(1.9)%	(1,565)	0.9 %	(1,088)	2.5 %
In process R&D	—	— %	26,395	(15.2)%	—	— %
Permanent items	1,135	0.7 %	711	(0.4)%	505	(1.2)%
Provision to return adjustments	1,091	0.6 %	126	(0.1)%	81	(0.2)%
Effect of change in federal tax rate	—	— %	—	— %	—	— %
Effect of change in state tax rate	4,405	2.6 %	3,478	(2.0)%	1,139	(2.6)%
Removal of excess tax benefit	—	— %	—	— %	—	— %
Increase in unrecognized tax benefits	828	0.5 %	439	(0.3)%	272	(0.6)%
Current year forfeitures	54	— %	435	(0.3)%	4,026	(9.2)%
Change in valuation allowance	(40,769)	(23.7)%	14,420	(8.3)%	4,343	(10.0)%
Net benefit	$ 36	— %	$ —	— %	$ —	— %

The components of deferred tax assets and liabilities at December 31, 2022 and 2021 were as follows (in thousands):

	December 31,	
	2022	2021
Deferred tax assets:		
Domestic net operating loss carryforwards	$ 84,147	$ 138,548
Research and development expenses	1,520	1,191
Capitalized Section 174 expenses	12,425	—
License fees	11,509	14,131
Research and development credits	20,166	17,738
Capital loss carryforwards	428	484
Accrued bonuses	722	888
Share-based compensation	6,132	4,885
Other	1,333	1,457
Total gross deferred tax assets	138,382	179,322
Valuation allowance	(137,936)	(178,705)
Total deferred tax assets	446	617
Deferred tax liabilities:		
Right-of-use asset	(446)	(617)
Total deferred tax liabilities	(446)	(617)
Total deferred tax assets and liabilities, net	$ —	$ —

At December 31, 2022, the Company had net operating loss carryforwards for federal and state tax purposes of approximately $394.8 million and $394.4 million, respectively. At December 31, 2021, the Company had net operating loss carryforwards for federal and state tax purposes of approximately $637.9 million and $455.4 million, respectively. Federal losses of $169.5 million begin to expire in 2035 and $225.3 million of the federal losses carryforward indefinitely. State losses of $391.7 million begin to expire in 2024 and $2.7 million of the state losses carryforward indefinitely. The tax benefit in 2022 related to utilization of net operating loss carryforwards is $51.2 million. In addition, the Company has tax credit carryforwards for federal tax purposes of approximately $26.6 million as of December 31, 2022. Of the $26.6 million, $0.1 million expired in 2022. The Company also has capital loss carryforwards for federal tax purposes of $1.9 million, which begin to expire in 2024. 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 2021 and as such, has no undistributed earnings. The Company dissolved the United Kingdom subsidiary in 2021.

The Company incorporated a subsidiary in Ireland during 2018. However, the subsidiary had no activity during 2020, 2021 and 2022, and as such, has no undistributed earnings.

The Company acquired Oncoceutics, Inc. in 2021 and is including the activity for 2022 in its consolidated financial statements.

In general, if the Company experiences a greater than 50% change, by value, in its equity ownership over a three-year period, utilization of its 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 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 an ownership change under Section 382 of the Code 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 acquired Oncoceutics net operating losses may be subject to limitations under Section 382, however no study has been completed as of the year ended December 31, 2022.

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, 2022 and 2021, as follows (in thousands):

Balance at December 31, 2020	$	4,295
Increases related to 2021		391
Increases related to prior periods		48
Balance at December 31, 2021		4,734
Increases related to 2022		828
Increases related to prior periods		—
Balance at December 31, 2022	$	5,562

On November 18, 2021, Governor Roy Cooper signed into law the 2021 Appropriations Act which phases out the corporate income tax for North Carolina. The Bill phases out the current 2.5% North Carolina corporate income tax rate over five years starting in 2025, reaching zero by 2030. For tax years beginning on or after January 1, 2025 the rate is 2.25%. The rate decreases to 2% in 2026 and 2027; and to 1% in 2028 and 2029. After 2029, the rate decreases to 0%. As a result of the revised tax rate, the Company adjusted its North Carolina net operating loss deferred tax asset as of December 31, 2021 by applying the revised tax rate, which resulted in a decrease to the deferred tax assets and a corresponding decrease to the valuation allowance of approximately $7.1 million in 2021 and $0.6 million in 2022.

The Company has determined that it had no other material uncertain tax benefits for the year ended December 31, 2022. As of December 31, 2022, 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 2002 through 2022. 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, 2022, 2021 and 2020.

The Tax Act subjects a "United States shareholder" for U.S. federal income tax purposes to tax 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 2019, 2020, 2021 or 2022; therefore, no GILTI tax has been recorded for the years ended December 31, 2021 and 2022.

Note 7. Significant Agreements

BARDA 2022 Procurement and Development Contract

On August 26, 2022, the Company entered into a procurement contract, as amended, (the BARDA Agreement) with BARDA for the delivery of up to 1.7 million treatment courses of tablet and suspension formulations of TEMBEXA® to the U.S. government. The BARDA Agreement consists of a five-year base period of performance and a total contract period of performance (base period plus option exercises) of up to ten years (if necessary). Under the terms of the BARDA Agreement, the base period activities are valued at approximately $127 million, consisting of an initial shipment of 319,000 treatment courses of TEMBEXA to be procured and shipped to the Strategic National Stockpile for an aggregate purchase price of approximately $115 million, and reimbursement for certain post-marketing activities of approximately $12 million. The options under the BARDA Agreement, which are exercised at the sole discretion of BARDA, are valued at approximately $553 million (if all such options are exercised during the 10-year contract period), which consists of options to purchase up to an additional 1.381 million treatment courses of TEMBEXA for an aggregate purchase price of approximately $551 million and funding for certain post-marketing activities of approximately $2 million.

In connection with the sale of the TEMBEXA franchise to Emergent, the BARDA Agreement was novated to Emergent in December 2022. In accordance with federal regulations, the terms of the novation agreement require that the company guarantee the performance of all obligations transferred to Emergent should Emergent not have the ability to deliver on the terms of the BARDA Agreement. In this instance BARDA may request that we perform the obligations in place of Emergent.

Emergent Biodefense Operations Lansing LLC

On September 26, 2022, the Company completed the Asset Sale to Emergent of the Company's exclusive worldwide rights to brincidofovir, including TEMBEXA® and specified related assets (the Asset Sale). Emergent paid the Company an upfront cash payment of approximately $238 million upon the closing of the Asset Sale. In addition, pursuant to the Asset Purchase Agreement, the Company is eligible to receive from Emergent: (i) up to an aggregate of approximately $124 million in milestone payments payable upon the exercise of the options under the BARDA Agreement for the delivery of up to 1.7 million treatment courses of tablet and suspension formulations of TEMBEXA to the U.S. government; (ii) royalty payments equal to 15% of the gross profits from the sales of TEMBEXA made outside of the United States; (iii) royalty payments equal to 20% of the gross profits from the sales of TEMBEXA made in the United States in excess of 1.7 million treatment courses; and (iv) up to an additional $12.5 million upon the achievement of certain other developmental milestones. The effects of recording certain adjustments associated with contingent consideration related to TEMBEXA have been excluded as the Company has made a policy election to account for these amounts when the contingency has been resolved in accordance with Accounting Standards Codification 450, *Contingencies*.

The Company continues to provide operational support to Emergent in furtherance of its obligations under both the Asset Purchase Agreement (and related agreements) and the BARDA Agreement. The BARDA Agreement was novated to Emergent in December 2022. Under the Asset Purchase Agreement, the Company recognized approximately $0.5 million of contract revenue for support provided for the twelve months ended December 31, 2022.

The sale of TEMBEXA constitutes a significant disposition of a business, however, the Company determined the disposition does not represent a strategic shift, and accordingly, the Company has not accounted for the disposition as a discontinued operation. The Company recorded a $229.7 million net gain on sale of business in other income (loss) on the Consolidated Statement of Operations and Comprehensive Income (Loss) for the twelve months ended December 31, 2022. The net gain consists of the following assets and liabilities transferred in accordance with the Asset Purchase Agreement (in thousands):

	As of September 26, 2022	
Up-front cash payment	$	237,987
Liabilities assumed by Emergent		1,423
Inventory transferred to Emergent		(5,227)
Prepaids transferred to Emergent		(511)
Transaction costs incurred		(4,002)
Net gain	**$**	**229,670**

TEMBEXA Procurement Agreements

In June 2022, the Company entered into a Supply Agreement (the Supply Agreement) with a third-party outside of North America (the Purchaser), pursuant to which the Company was responsible for supplying to the Purchaser, and the Purchaser was responsible for purchasing from the Company, TEMBEXA treatment courses for use in a jurisdiction outside of the United States. Under the terms of the Supply Agreement, the Purchaser paid the Company an aggregate purchase price of approximately $9.3 million, in two equal installments in June 2022 and July 2022. The Company recognized $9.3 million of procurement revenue under the Supply Agreement for the twelve months ended December 31, 2022.

Additionally, in June 2022, the Public Health Agency of Canada (PHAC) awarded a Contract (PHAC Contract) to the Company, pursuant to which PHAC agreed to purchase up to approximately $25.3 million (CAD $33.0 million) of TEMBEXA treatment courses for use in Canada. Substantially all of the procurement was delivered and accepted by PHAC in July 2022, completing the performance obligation for those shipments and resulting in $22.6 million of procurement revenue for the twelve months ended December 31, 2022. PHAC assigned the PHAC Contract to Emergent in November 2022. The remaining deliveries of treatment courses were delivered by Emergent and are subject to the royalty terms of the Asset Purchase Agreement applicable to gross profits outside the United States. The Company recognized approximately $0.4 million of royalty revenue in the twelve months ended December 31, 2022.

BARDA 2011 Research and Development Contract

In February 2011, the Company entered into a contract with BARDA for the advanced development of TEMBEXA as a medical countermeasure in the event of a smallpox release. Under the contract, BARDA agreed to reimburse the Company, plus pay a fixed fee, for the research and development of TEMBEXA 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, the Company received $72.5 million in expense reimbursement and $4.6 million in fees.

The fourth option segment ended on September 1, 2021 and the contract has expired in accordance with its terms. For the years ended December 31, 2021 and 2020, the Company recognized contract revenue under this contract of $1.6 million and $5.3 million, respectively.

Ohara Agreement

In 2019, Oncoceutics, Inc., a Delaware corporation (Oncoceutics) which was subsequently acquired by the Company in January 2021, entered into a license, development and commercialization agreement with Ohara Pharmaceutical Co., Ltd. for ONC201 in Japan. The Company is entitled to receive up to $2.5 million in nonrefundable regulatory milestone payments. The Company is entitled to double-digit tiered royalties based on the aggregate annual net sales of all products, as defined in the agreement, in Japan.

CR Sanjiu Agreement

In December 2020, Oncoceutics entered into a license, development and commercialization agreement with China Resources Sanjiu Medical & Pharmaceutical Co., Ltd. (CR Sanjiu). Oncoceutics granted CR Sanjiu an exclusive royalty bearing license to develop and commercialize ONC201 in China, Hong Kong, Macau and Taiwan (CR Sanjiu Territory). The Company is entitled to receive up to $5.0 million in nonrefundable regulatory milestone payments. The Company is entitled to double-digit tiered royalties based on the aggregate annual net sales of all licensed products, as defined in the agreement, in the CR Sanjiu Territory.

Note 8. DSTAT Contract Close-out

In May 2022, the Company made the decision to discontinue the development of DSTAT for the treatment of AML. Effective July 12, 2022, the Company terminated the License and Development Agreement with Cantex Pharmaceuticals, Inc. As a result, the Company recorded an accrual of expenses to close-out the DSTAT vendor contracts. As of December 31, 2022, on the Consolidated Balance Sheets, the Company has recorded $1.4 million of contract close-out costs in accrued liabilities offset by a vendor credit of $0.1 million in accounts payable, which included additional expense of $0.8 million recorded to research and development expenses for the twelve months ended December 31, 2022, on the Consolidated Statement of Operations after the decision to discontinue to the DSTAT program. These balances are expected to be fully paid over the first half of 2023.

The following table summarizes the contract close-out costs (in thousands) recorded for the twelve months ended December 31, 2022:

	Contract Close-out Costs
Research & development	$ 791
General & administrative	8
Total contract close-out expenses	$ 799

The following table sets forth the accounts payable and accrual activity for contract close-out costs (in thousands) for the twelve months ended December 31, 2022.

	Contract Close-out Costs
Balance at June 30, 2022	$ 4,539
Revised estimates	$ (746)
Payments	$ (2,482)
Balance at December 31, 2022	$ 1,311

Note 9. Oncoceutics Acquisition

On January 7, 2021, we entered into an agreement to acquire Oncoceutics, a privately-held, clinical-stage biotechnology company developing imipridones, a novel potential class of compounds. As consideration for the acquisition, 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) made an additional cash payment of $14.0 million 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 ONC201 and ONC206 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. Pursuant to the merger agreement we have certain diligence obligations with respect to further development and commercialization of the Oncoceutics product candidates.

The promissory note totaling $14.0 million was paid to the Oncoceutics' shareholders in January 2022. A $20.0 million milestone payment was paid and expensed to research and development expenses in the fourth quarter of 2021 related to the achievement of the 20% ORR, evaluated by BICR, of ONC201 in recurrent H3 K27M-mutant glioma patients success milestone.

The Company accounted for the Oncoceutics acquisition as an asset acquisition as the majority of the value of the assets acquired related to the ONC201 acquired in-process research and development (IPR&D) asset. In accordance with Accounting Standards Codification (ASC) Subtopic 730-10-25, Accounting for Research and Development Costs, the up-front payments to acquire a new drug compound, are immediately expensed as acquired IPR&D and future milestone payments are expensed to research and development expenses when paid or payable 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. Therefore, the portion of the purchase price that was allocated to the IPR&D assets acquired was immediately expensed. Other assets acquired and liabilities assumed, were recorded at fair value.

The following represents the consideration paid and purchase price allocation for the acquisition of Oncoceutics (in thousands, except for per share data):

Cash	$	23,836
One-year closing anniversary payment		14,000
Shares common stock issued as consideration		8,723,769
Stock price per share on effective date		4.98
Value of estimated common stock consideration		43,445
Total consideration	**$**	**81,281**
Net assets acquired	$	(1,310)
IPR&D assets expensed		82,591
Total purchase price allocated	**$**	**81,281**
Transaction costs expensed to IPR&D[(1)]	$	299
Total IPR&D expensed	**$**	**82,890**

(1) As a result of the asset acquisition accounting, the transaction costs associated with the acquisition should be included in the costs of the assets acquired. The primary asset acquired, the IPR&D asset, was expensed and the transaction related costs were included with and expensed with this asset. The transaction costs primarily included financial advisor fees, legal expenses and auditor expenses. Additionally, there were $0.6 million of expenses related to this acquisition recorded in the fourth quarter of 2020 to general and administrative expenses in the Consolidated Statements of Operations and Comprehensive Loss.

Note 10. Restructuring Costs

In December 2022, the Company made the decision to restructure its operations, which included a reduction in workforce of 20

full-time employees. The Company recorded expense for one-time employee termination benefits of $1.9 million, during the twelve months ended December 31, 2022, which includes $0.4 million of the total $1.0 million of stock compensation expense related to modifications of stock option agreements of employees included in the reduction in workforce that will be expenses ratably from the announcement date through the date of termination. As of December 31, 2022, the Company had a severance accrual balance of $1.4 million.

The following table summarizes the restructuring charges (in thousands) recorded for the twelve months ended December 31, 2022:

	Employee Termination Benefits
Research and development	$ 1,768
General and administrative	86
Total restructuring expenses	$ 1,854

Note 11. 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, 2022, and events which occurred subsequently but were not recognized in the financial statements.

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, 2022, 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, 2022.

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

Not applicable.

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 2023 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, 2022, 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** [16]	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 [2]	Amended and Restated Bylaws of the Registrant.
4.1 [1]	Form of Common Stock Certificate of the Registrant.
4.2	Description of Common Stock
10.1+ [1]	Form of Indemnity Agreement by and between the Registrant and its directors and officers.
10.2+[8]	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.
10.3+ [3]	Chimerix, Inc. 2013 Equity Incentive Plan, as amended.
10.4+ [13]	Form of Stock Option Grant Notice, Option Agreement and Notice of Exercise for Inducement Grant Outside of 2013 Equity Incentive Plan
10.5+ [1]	Chimerix, Inc. 2013 Employee Stock Purchase Plan.
10.6+ [14]	Chimerix, Inc. Non-Employee Director Compensation Policy.
10.7+ [11]	Chimerix, Inc. Officer Severance Benefit Plan, as amended.
10.8+ [7]	Directorship Offer Letter to Catherine L. Gilliss dated June 13, 2014.
10.9+ [7]	Directorship Offer Letter to Patrick Machado dated May 30, 2014.
10.10 [1]	Office Lease by and between the Registrant and ACP 2505 Meridian LLC dated September 1, 2007, as amended.
10.11 [4]	Fifth Amendment to Office Lease dated July 2, 2014 by and between the Registrant and AREP Meridian I LLC.
10.12 [6]	Sixth Amendment to Office Lease dated April 28, 2015 by and between the Registrant and IVC Meridian TT O, LLC.
10.13 [8]	Seventh Amendment to Office Lease dated March 10, 2017 by and between the Registrant and IVC Meridian TT O, LLC.
10.14 [9]	Eighth Amendment to Office Lease dated July 13, 2017 by and between the Registrant and IVC Meridian TT O, LLC.
10.15 [15]	Ninth Amendment to Office Lease, dated June 24, 2020, by and between the Registrant and BRI 1875 Meridian, LLC.
10.16 [5]	Lease Agreement by and between the Registrant and Northwood RTC LLC dated March 10, 2014.
10.17 [10]	First Amendment to Industrial Building Lease dated December 14, 2017 by and between Registrant and CLPF - Research Center, LLC.
10.18** [15]	Second Amendment to Lease Agreement, dated July 30, 2020, by and between the Registrant and CLPF-Research Center, LLC.
10.19+ [12]	Employment Offer Letter to Michael Sherman dated April 2, 2019.
10.20+ [12]	Employment Offer Letter to Michael Andriole dated April 4, 2019.
10.21+	Employment Offer Letter to Allen Melemed dated May 7, 2020.

10.22+[17]	Employment Offer Letter to Michael A. Alrutz dated May 19, 2012.
10.23** #[18]	Loan and Security Agreement, dated January 31, 2022, by and between the Registrant and Silicon Valley Bank.
10.24**#[19]	Asset Purchase Agreement, dated May 15, 2022, by and between the Company and Emergent BioSolutions Inc.
10.25**#[20]	First Amendment to Asset Purchase Agreement, dated September 26, 2022, by and between the Registrant, Emergent BioSolutions Inc. and Emergent Biodefense Operations Lansing LLC.
21.1	Subsidiaries of Chimerix, Inc.
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.
#	Schedules have been omitted pursuant to Item 601(a)(5) of Regulation S-K. The registrant hereby undertakes to furnish supplemental copies of any of the omitted schedules upon request by the SEC.
*	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 because the Registrant has determined (i) the omitted information is not material and (ii) the omitted information would likely cause harm to the Registrant if publicly disclosed.
(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 December 9, 2022.
(3)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on June 23, 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 May 11, 2015.
(7)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 6, 2015.
(8)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 2, 2017.
(9)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on May 9, 2017.
(10)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 1, 2018.
(11)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on April 18, 2022.
(12)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on April 10, 2019.
(13)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 8, 2019.
(14)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on February 25, 2020.
(15)	Incorporated by reference to Chimerix, Inc.'s Quarterly Report on Form 10-Q (No. 001-35867) filed with the SEC on August 10, 2020.
(16)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on February 25, 2021.
(17)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 5, 2019.
(18)	Incorporated by reference to Chimerix, Inc.'s Annual Report on Form 10-K (No. 001-35867) filed with the SEC on March 1, 2022.
(19)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on May 18, 2022.
(20)	Incorporated by reference to Chimerix, Inc.'s Current Report on Form 8-K (No. 001-35867) filed with the SEC on September 28, 2022.

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: March 2, 2023 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)	March 2, 2023
/s/ Michael T. Andriole Michael T. Andriole	Chief Business and Financial Officer (Principal Financial Officer)	March 2, 2023
/s/ David Jakeman David Jakeman	Executive Director of Finance and Accounting (Principal Accounting Officer)	March 2, 2023
/s/ Martha J. Demski Martha J. Demski	Chair of the Board of Directors	March 2, 2023
/s/ Catherine L. Gilliss Catherine L. Gilliss, PhD, RN, FAAN	Member of the Board of Directors	March 2, 2023
/s/ Patrick Machado Patrick Machado	Member of the Board of Directors	March 2, 2023
/s/ Robert J. Meyer Robert J. Meyer, MD	Member of the Board of Directors	March 2, 2023
/s/ Fred A. Middleton Fred A. Middleton	Member of the Board of Directors	March 2, 2023
/s/ Pratik S. Multani Pratik S. Multani, MD	Member of the Board of Directors	March 2, 2023
/s/ Victoria Vakiener Victoria Vakiener	Member of the Board of Directors	March 2, 2023

[LETTERHEAD OF CHIMERIX INC]

May 7, 2020

Allen S. Melemed, M.D., M.B.A.
375 Fox Pond Road
Aiken, SC 29801

Dear Allen,

Chimerix is pleased to extend an offer of employment to you for the position of Chief Medical Officer. This position reports to Mike Sherman, President and CEO. Our offer of employment is contingent on successful completion of our background screening process including, but not limited to verification of previous employment, education, references, drug test, etc. We are hopeful that you will accept this offer and look forward to the prospect of having a mutually successful relationship with you. Your anticipated hire date will be June 16, 2020.

The following are the terms of this offer:

Base Salary: Your per pay period base salary will be $18,125.00 (annualized, $435,000.00). Currently, paychecks are issued semi-monthly for a total of 24 pay periods per year.

Stock Options: You will be granted an option to purchase 400,000 shares of Chimerix common stock. All stock option grants are subject to the vesting schedule and terms and conditions outlined in the Chimerix 2013 Equity Incentive Plan ("the Plan"). You will be issued a grant notice, option agreement and details of the Plan. Such shares shall vest over a period of four (4) years so long as you continue to provide services to the Company, with 25% vesting one year from the vesting commencement date and the balance vesting at the rate of 1/36 per month over the remaining three (3) years. The exercise price of the options to be granted will be equal to the closing per share price of Chimerix common stock (as determined by NASDAQ) on your official start date of employment.

Additional vesting scenarios are discussed below under the heading "Severance Plan."

Target Bonus: As part of the Chimerix senior management team in 2020 you will be eligible for an annual bonus of up to 40% of your base salary and for 2020, this bonus will be pro-rated based on months of service. Such bonus is paid in 2021 and is based upon your

achievement of the goals and objectives agreed to in the performance dialog process with your manager and the formula determined by the Board of Directors for 2020.

Benefits:

As an employee of Chimerix you will be eligible for comprehensive health and dental insurance benefits for yourself and your eligible dependents, effective on the first day of employment. Currently, employees contribute 20% of the Company's monthly premium for their elected coverages. You will also be eligible for Company-paid term life insurance, short term and long-term disability insurance, effective on your hire date.

Additional benefits for which you will be eligible include: accrued vacation equal to Twenty (20) days per year and twelve (12) paid holidays per calendar year. With a June 16 start date, your vacation time in 2020 will be twelve (12) days. You will also be eligible to participate in the Chimerix 401(k) Plan, effective on the first day of the month, following your date of hire (July 1, 2020). Full details of group benefits will be provided once you are on board.

Severance Plan: Upon joining, you are eligible to participate in the Company's severance plan for executive officers. Under this plan, you would receive 12 months of salary and benefits continuation in the event of a termination by the Company that is not in connection with a change of control. In addition, such a termination would result in 12 months' forward acceleration of any unvested portion of your option grant.

In the event of a termination in connection with a change of control, in addition to 12 months of salary continuation, eligible executives receive a payment equal to their current target bonus. Your option grant is subject to a standard "double trigger" vesting acceleration provision that applies in the event of a change in control occurring after the first three months of your employment. Specifically, if your employment is terminated within 13 months after a change of control of Chimerix (and the change in control happens after 90 days of your start date), the vesting of your stock option will be accelerated in full.

In all cases, receipt of the severance benefit assumes a termination by the Company without Cause or by you for Good Reason (each as defined in the severance plan) and is contingent upon the execution of an approved release and non-compete agreement.

Signing Bonus: Within 30 days of joining Chimerix you will be eligible for a signing bonus of $150,000. In the event your employment is terminated by you without Good Reason or by the Company with Cause within twenty-four months of joining the Company, you will be obligated to repay this bonus amount to the Company.

Your right to receive this bonus payment may not be assigned, transferred, pledged, encumbered, or attached, and any attempt, voluntary or involuntary, to effect such action shall be null, void and of no effect. Chimerix agrees that it shall be obligated to assign this obligation to any party which acquires all or substantially all of the assets of Chimerix. This bonus obligation shall be binding upon any successors to Chimerix. Nothing contained herein shall be construed as a contract of employment or to confer upon you any rights to continued employment.

The bonus payments are intended to qualify as short-term deferral payments meeting the requirements of Treasury Regulations Section 1.409A-1(b)(4), and this Agreement shall be construed in accordance with that intent. References to termination of employment in this paragraph shall mean your “separation from service” within the meaning of Internal Revenue Code Section 409A(a)(2)(A)(i). To the extent that Internal Revenue Code Section 409A applies to any payments under this letter, this letter shall be construed consistently with the requirements of that law such that
payments hereunder shall not be included in your income until such payments are actually paid to you.

Chimerix is an at-will employer and as such your employment must be entered into voluntarily and for no specified period. As a result, you are free to resign or the company may terminate your employment at any time, for any reason, with or without cause. No
one other than the CEO has the authority to alter this employment relationship, either verbally or in writing.

As with all new employees, you will be asked to provide to the Company documentary evidence of your eligibility for employment in the United States when you join the Company. Such documentation must be provided to us within three business days of your date of hire, or our employment relationship with you may be terminated.

Please understand it is the policy of the Company not to solicit or accept proprietary information and/or trade secrets of other companies. If you have or have had access to trade secrets or other confidential, proprietary information developed by your former

employer; the use of such information in performing your duties at Chimerix is prohibited. This may include, but is not limited to, confidential or proprietary information in the form of documents, magnetic media, software, customer lists, formulae and business plans or strategies. You will be required to execute a standard Proprietary Information and Inventions Agreement with Chimerix, a copy of which is attached as Exhibit A.

If you accept this offer, the terms described in this letter, together with the Proprietary Information and Inventions Agreement, shall be the terms of your employment, provided, however, that your duties are performed in accordance with all standards and policies adopted by the company. Your duties may change from time to time, depending upon the needs of the company and your skills. This letter supersedes any prior agreements, representations or promises of any kind, express or implied, concerning your employment and it constitutes the full and complete agreement between you and the Company.

We are very excited about the prospect of your joining our team. We are confident that you have much to contribute to the success of Chimerix. The strength of our technology, the quality and experience of our personnel and your presence will facilitate this success.

This offer expires five business days after your receipt of this letter. If the terms described herein are acceptable to you, please acknowledge your acceptance by signing below and returning the original to us in the envelope provided. You may also forward your acceptance via secured fax to 919-313-6781. Please keep a copy for your records.

Allen, all of us at Chimerix look forward to your joining our team!

With warm regards,

CHIMERIX, Inc.

/s/ Michael Sherman
Michael Sherman
President and CEO

Enclosures

Accepted:

/S/ Allen S. Melemed 6/6/2020
Allen S. Melemed Date

Exhibit 21.1

Subsidiaries of Chimerix, Inc.

Oncoceutics, Inc., a Delaware corporation

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, 333-236610, 333-253494, and 333-263131) 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 and 333-255810) of Chimerix, Inc.;

of our reports dated March 2, 2023 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, 2022.

/s/ Ernst & Young LLP

Raleigh, North Carolina
March 2, 2023

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, 2022 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: March 2, 2023

/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, 2022 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: March 2, 2023

/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, 2022, 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: March 2, 2023

/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, 2022, 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: March 2, 2023

/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.

DESCRIPTION OF COMMON STOCK

The following summary description of the common stock of Chimerix, Inc. (we, our or us) is based on the provisions of our amended and restated certificate of incorporation, as well as our amended and restated bylaws, and the applicable provisions of the Delaware General Corporation Law. This information is qualified entirely by reference to the applicable provisions of our amended and restated certificate of incorporation, amended and restated bylaws, and the Delaware General Corporation Law. Our amended and restated certificate of incorporation and amended and restated bylaws have previously been filed as exhibits with the Securities and Exchange Commission.

Common Stock

Voting Rights

Our common stock is entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders, including the election of directors, and does not have cumulative voting rights.

Dividends and Other Distributions

Subject to preferences that may be applicable to any then outstanding preferred stock, the holders of common stock are entitled to receive dividends, if any, as may be declared from time to time by our board of directors out of legally available funds.

Distribution on Dissolution

In the event of our liquidation, dissolution or winding up, holders of our common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities, subject to the satisfaction of any liquidation preference granted to the holders of any outstanding shares of preferred stock.

Rights and Preferences

Holders of our common stock have no preemptive, conversion or subscription rights, and there are no redemption or sinking fund provisions applicable to our common stock. The rights, preferences and privileges of the holders of our common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of our preferred stock that we may designate and issue in the future.

Anti-Takeover Provisions of Delaware Law and Our Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws

Section 203 of the Delaware General Corporation Law

We are subject to Section 203 of the Delaware General Corporation Law, or Section 203. Section 203 generally prohibits a public Delaware corporation from engaging in a “business combination” with an “interested stockholder” for a period of three years after the date of the transaction in which the person became an interested stockholder, unless:

- prior to the date of the transaction, the board of directors of the corporation approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder;
- upon completion of the transaction that resulting in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the commencement of the transaction, excluding for purposes of determining the number of shares outstanding (but not the outstanding voting stock owned by the interested stockholder) (a) shares owned by persons who are directors and also officers and (b) shares owned by employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or

- on or subsequent to the consummation of the transaction, the business combination is approved by the board and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock which is not owned by the interested stockholder.

Section 203 defines a "business combination" to include the following:

- any merger or consolidation involving the corporation and the interested stockholder;
- any sale, lease, exchange, mortgage, pledge, transfer or other disposition involving the interested stockholder of 10% or more of the assets of the corporation;
- subject to exceptions, any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder;
- subject to exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder; and
- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.

In general, Section 203 defines an interested stockholder as any entity or person beneficially owning 15% or more of the outstanding voting stock of the corporation and any entity or person affiliated with or controlling or controlled by the entity or person.

The statute could prohibit or delay mergers or other takeover or change in control attempts and, accordingly, may discourage attempts to acquire us even though such a transaction may offer our stockholders the opportunity to sell their stock at a price above the prevailing market price.

Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws

Provisions of our amended and restated certificate of incorporation and amended and restated bylaws may delay or discourage transactions involving an actual or potential change in our control or change in our management, including transactions in which stockholders might otherwise receive a premium for their shares or transactions that our stockholders might otherwise deem to be in their best interests. Therefore, these provisions could adversely affect the price of our common stock. Among other things, our amended and restated certificate of incorporation and amended and restated bylaws:

- permit our board of directors to issue up to 10,000,000 shares of preferred stock, with any rights, preferences and privileges as they may designate (including the right to approve an acquisition or other change in our control);
- provide that the authorized number of directors may be changed only by resolution adopted by a majority of the board of directors;
- provide that the board of directors or any individual director may only be removed with cause and the affirmative vote of the holders of at least 66 2/3% of the voting power of all of our then outstanding common stock;
- provide that all vacancies, including newly created directorships, may, except as otherwise required by law or subject to the rights of holders of preferred stock as designated from time to time, be filled by the affirmative vote of a majority of directors then in office, even if less than a quorum;
- divide our board of directors into three classes;
- require that any action to be taken by our stockholders must be effected at a duly called annual or special meeting of stockholders and not be taken by written consent;
- provide that stockholders seeking to present proposals before a meeting of stockholders or to nominate candidates for election as directors at a meeting of stockholders must provide notice in

writing in a timely manner and also specify requirements as to the form and content of a stockholder's notice;

- do not provide for cumulative voting rights (therefore allowing the holders of a majority of the shares of common stock entitled to vote in any election of directors to elect all of the directors standing for election, if they should so choose);

- provide that special meetings of our stockholders may be called only by the chairman of the board, our Chief Executive Officer or by the board of directors pursuant to a resolution adopted by a majority of the total number of authorized directors (whether or not there exists any vacancies); and

- provide that the Court of Chancery of the State of Delaware will be the sole and exclusive forum for (i) any derivative action or proceeding brought on our behalf, (ii) any action asserting a claim of breach of a fiduciary duty owed by any of our directors or officers to us or our stockholders, (iii) any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law or our certificate of incorporation or bylaws, or (iv) any action asserting a claim against us governed by the internal affairs doctrine (these choice of forum provisions do not apply to suits brought to enforce a duty or liability created by the Securities Act, the Exchange Act, or any other claim for which the federal courts have exclusive jurisdiction).

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% of the voting power of all of our then outstanding common stock.

Listing

Our common stock is listed on The Nasdaq Global Market under the trading symbol "CMRX."

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare Trust Company, N.A. The transfer agent and registrar's address is P.O. Box 43078, Providence, Rhode Island 02940.