UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10-Q

(Mark One)

☑ QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the quarterly period ended June 30, 2021

OR

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Commission File Number: 001-33038

ZIOPHARM Oncology, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**84-1475642**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**

One First Avenue, Parris Building 34, Navy Yard Plaza
Boston, Massachusetts 02129
(617) 259-1970
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock	**ZIOP**	**The Nasdaq Stock Market LLC**

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 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 whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of ‘‘large accelerated filer,’’ ‘‘accelerated filer,’’ ‘‘smaller reporting company,’’ and ‘‘emerging growth company’’ in Rule 12b–2 of the Exchange Act.

Large Accelerated Filer	☐	Accelerated Filer	☒
Non-Accelerated Filer	☐	Smaller Reporting Company	☐
		Emerging Growth Company	☐

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

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

As of July 31, 2021, the number of outstanding shares of the registrant's common stock, $0.001 par value, was 215,559,148 shares.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q contains forward-looking statements that are based on our current beliefs and expectations. These forward-looking statements may be accompanied by such words as “anticipate,” “believe,” “estimate,” “expect,” “forecast,” “intend,” “may,” “plan,” “project,” “target,” “will” and other words and terms of similar meaning, although not all forward-looking statements contain these identifying words. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements. Although we believe that we have a reasonable basis for each forward-looking statement contained in this Quarterly Report, we caution you that these statements are based on a combination of facts and factors currently known by us and our expectations of the future, about which we cannot be certain.

The forward-looking statements in this Quarterly Report include, but are not limited to, statements about:

- our ability to raise substantial additional capital to fund our planned operations in the near term;
- estimates regarding our expenses, use of cash, timing of future cash needs and anticipated capital requirements;
- the development of our product candidates, including statements regarding the initiation, timing, progress and results of our preclinical clinical studies, clinical trials and research and development programs;
- our ability to advance our product candidates through various stages of development, especially through pivotal safety and efficacy trials;
- the risk that final trial data may not support interim analysis of the viability of our product candidates;
- our expectation regarding the safety and efficacy of our product candidates;
- the timing, scope or likelihood of regulatory filings and approvals from the U.S. Food and Drug Administration or equivalent foreign regulatory agencies for our product candidates and for which indications;
- our ability to license additional intellectual property relating to our product candidates from third parties and to comply with our existing license agreements;
- our ability to enter into partnerships or strategic collaboration agreements, our ability to achieve the results contemplated and the potential benefits to be derived from relationships with collaborators;
- our ability to maintain and establish collaborations and licenses; developments and projections relating to competition from other pharmaceutical and biotechnology companies or our industry;
- our estimates regarding the potential market opportunity for our product candidates;
- the anticipated rate and degree of commercial scope and potential, as well as market acceptance of our product candidates for any indication, if approved;
- the anticipated amount, timing and accounting of contract liability (formerly deferred revenue), milestones and other payments under licensing, collaboration or acquisition agreements, research and development costs and other expenses;
- our intellectual property position, including the strength and enforceability of our intellectual property rights;
- our ability to attract, hire, and retain qualified employees and key personnel;
- the impact of government laws and regulations in the United States and foreign countries;
- our expectations regarding the impact of the ongoing coronavirus disease 2019, or COVID-19, pandemic, including the expected duration of disruption and immediate and long-term impact and effect on our business and operations;
- the diversion of healthcare resources away from the conduct of clinical trials as a result of the ongoing COVID-19 pandemic, including the diversion of hospitals serving as our clinical trial sites and hospital staff supporting the conduct of our clinical trials;
- the interruption of key clinical trial activities, such as clinical trial site monitoring, due to limitations on travel, quarantines or social distancing protocols imposed or recommended by federal or state governments, employers and others in connection with the ongoing COVID-19 pandemic; and
- other risks and uncertainties, including those listed under Part II, Item 1A, “Risk Factors”.

Any forward-looking statements in this Quarterly Report on Form 10-Q reflect our current views with respect to future events or to our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual

results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by these forward-looking statements. Factors that may cause actual results to differ materially from current expectations include, among other things, those listed under Part II, Item 1A. “Risk Factors” and elsewhere in this Quarterly Report on Form 10-Q. Given these uncertainties, you should not place undue reliance on these forward-looking statements. Except as required by law, we assume no obligation to update or revise these forward-looking statements for any reason, even if new information becomes available in the future.

NOTE REGARDING COMPANY REFERENCES

Throughout this Quarterly Report on Form 10-Q, “Ziopharm,” the “Company,” “we,” “us” and “our” refer to ZIOPHARM Oncology, Inc. and its subsidiaries.

NOTE REGARDING TRADEMARKS

All trademarks, trade names and service marks appearing in this Quarterly Report on Form 10-Q are the property of their respective owners.

SUMMARY OF SELECTED RISKS ASSOCIATED WITH OUR BUSINESS

Our business faces significant risks and uncertainties. If any of the following risks are realized, our business, financial condition and results of operations could be materially and adversely affected. You should carefully review and consider the full discussion of our risk factors in the section titled “Risk Factors” in Part I, Item 1A of this Quarterly Report. Some of the more significant risks include the following:

- Our business, operations and clinical development plans and timelines could be adversely affected by the effects of health epidemics, including the COVID-19 pandemic, on the manufacturing, clinical trial and other business activities performed by us or by third parties with whom we conduct business, including our contract manufacturers, clinical research organizations, or CROs, shippers and others.
- We will require substantial additional financial resources to continue ongoing development of our product candidates and pursue our business objectives; if we are unable to obtain these additional resources when needed, we may be forced to delay or discontinue our planned operations, including clinical testing of our product candidates.
- Our plans to develop and commercialize non-viral TCR T-cell as well as CAR-T therapies can be considered as new approaches to cancer treatment, the successful development of which is subject to significant challenges.
- Our current product candidates are based on novel technologies and are supported by limited clinical data and we cannot assure you that our current and planned clinical trials will produce data that supports regulatory approval of one or more of these product candidates.
- If we are unable to obtain the necessary U.S. or worldwide regulatory approvals to commercialize any product candidate, our business will suffer.
- Our product candidates are in various stages of clinical trials, which are very expensive and time-consuming. We cannot be certain when we will be able to submit a BLA to the FDA and any failure or delay in completing clinical trials for our product candidates could harm our business.
- We have identified a material weakness in our internal controls over financial reporting as of June 30, 2021 and may identify additional material weaknesses in the future or otherwise fail to maintain an effective system of internal controls, which may result in material misstatements of our financial statements or could have a material adverse effect on our business and trading price of our securities.
- Our cell-based and gene therapy immuno-oncology products rely on the availability of reagents, specialized equipment, and other specialty materials and infrastructure, which may not be available to us on acceptable terms or at all. For some of these reagents, equipment, and materials, we rely or may rely on sole source vendors or a limited number of vendors, which could impair our ability to manufacture and supply our products.
- Our immuno-oncology product candidates are based on a novel technology, which makes it difficult to predict the time and cost of product candidate development and subsequently obtaining regulatory approval. Currently, limited numbers of gene therapy and cell therapy products have been approved in the United States and Europe.

- Our reliance on third parties to formulate and manufacture our product candidates exposes us to a number of risks that may delay the development, regulatory approval and commercialization of our products or result in higher product costs.
- If we are unable either to create sales, marketing and distribution capabilities or enter into agreements with third parties to perform these functions, we will be unable to commercialize our product candidates successfully.
- Our immuno-oncology product candidates may face competition in the future from biosimilars and other developing technologies.
- If we or our licensors fail to adequately protect or enforce our intellectual property rights or secure rights to patents of others, the value of our intellectual property rights would diminish and our ability to successfully commercialize our products may be impaired.
- Our stock price has been, and may continue to be, volatile.

ZIOPHARM Oncology, Inc.

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Part I - Financial Information

Item 1. Financial Statements

ZIOPHARM Oncology, Inc.

BALANCE SHEETS
(unaudited)

(in thousands, except share and per share data)

	June 30, 2021	December 31, 2020
ASSETS		
Current assets:		
Cash and cash equivalents	$ 76,746	$ 115,069
Receivables	7,626	4,665
Prepaid expenses and other current assets	5,035	10,855
Total current assets	89,407	130,589
Property and equipment, net	11,606	10,231
Right of use asset	5,371	4,650
Deposits	365	130
Other non-current assets	16	745
Total assets	$ 106,765	$ 146,345
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 982	$ 960
Accrued expenses	11,846	16,589
Lease liability - current portion	765	819
Total current liabilities	13,593	18,368
Lease liability - noncurrent portion	4,891	3,995
Total liabilities	18,484	22,363
Commitments and contingencies (Note 7)		
Stockholders' equity:		
Common stock, $0.001 par value; 350,000,000 shares authorized; 215,559,148 and 214,591,906 shares issued and outstanding at June 30, 2021 and December 31, 2020, respectively	216	215
Additional paid-in capital	896,390	887,868
Accumulated deficit	(808,325)	(764,101)
Total stockholders' equity	88,281	123,982
Total liabilities and stockholders' equity	$ 106,765	$ 146,345

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

ZIOPHARM Oncology, Inc.

STATEMENTS OF OPERATIONS
(unaudited)

(in thousands, except share and per share data)

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
	2021	2020	2021	2020
Operating expenses:				
Research and development	$ 13,570	$ 12,051	$ 26,906	$ 24,757
General and administrative	9,069	6,555	17,296	12,509
Total operating expenses	22,639	18,606	44,202	37,266
Loss from operations	(22,639)	(18,606)	(44,202)	(37,266)
Other income (expense), net	(31)	10	(22)	377
Net loss	$ (22,670)	$ (18,596)	$ (44,224)	$ (36,889)
Basic and diluted net loss per share	$ (0.11)	$ (0.09)	$ (0.21)	$ (0.18)
Weighted average common shares outstanding used to compute basic and diluted net loss per share	214,426,406	212,792,403	214,191,839	206,303,586

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

ZIOPHARM Oncology, Inc.

STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY
For the Six Months Ended June 30, 2021 and 2020
(unaudited)

(in thousands, except share and per share data)

For the Three Months Ended June 30, 2021

	Common Stock		Additional Paid In Capital	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount			
Balance at March 31, 2021	215,257,674	$ 215	$ 891,081	$ (785,655)	$ 105,641
Stock-based compensation	-	-	5,290	-	5,290
Exercise of employee stock options	10,667	-	20	-	20
Restricted stock awards	412,898	1	(1)	-	-
Cancelled restricted common stock	(122,091)	-	-	-	-
Net loss	-	-	-	(22,670)	$ (22,670)
Balance at June 30, 2021	215,559,148	$ 216	$ 896,390	$ (808,325)	$ 88,281

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

For the Six Months Ended June 30, 2021

	Common Stock		Additional Paid In Capital	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount			
Balance at December 31, 2020	214,591,906	$ 215	$ 887,868	$ (764,101)	$ 123,982
Stock-based compensation	-	-	7,486	-	7,486
Exercise of employee stock options	363,109	-	1,036	-	1,036
Restricted stock awards	726,224	1	-	-	1
Cancelled restricted common stock	(122,091)	-	-	-	-
Net loss	-	-	-	(44,224)	(44,224)
Balance at June 30, 2021	215,559,148	$ 216	$ 896,390	$ (808,325)	$ 88,281

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

ZIOPHARM Oncology, Inc.

STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY…continued
For the Six Months Ended June 30, 2021 and 2020
(unaudited)

(in thousands, except share and per share data)

For the Three Months Ended June 30, 2020

	Common Stock		Additional Paid In Capital	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount			
Balance at March 31, 2020	$ 214,286,337	$ 214	$ 882,541	$ (702,418)	$ 180,337
Stock-based compensation	-	-	1,661	-	1,661
Exercise of employee stock options	5,833	-	12	-	12
Net loss	-	-	-	(18,596)	(18,596)
Balance at June 30, 2020	$ 214,292,170	$ 214	$ 884,214	$ (721,014)	$ 163,414

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

For the Six Months Ended June 30, 2020

	Common Stock		Additional Paid In Capital	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount			
Balance at December 31, 2019	181,803,320	$ 182	$ 778,953	$ (684,125)	$ 95,010
Stock-based compensation	-	-	3,601	-	3,601
Exercise of employee stock options	8,166	-	16	-	16
Issuance of restricted common stock	555,900	1	(1)	-	-
Issuance of common stock in connection with a public offering, net of commissions and expense of $5.9 million	29,110,111	29	88,632	-	88,661
Issuance of common stock in connection with an at the market offering, net of commissions of $0.4 million	2,814,673	2	13,013	-	13,015
Net loss	-	-	-	(36,889)	(36,889)
Balance at June 30, 2020	214,292,170	$ 214	$ 884,214	(721,014)	163,414

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

ZIOPHARM Oncology, Inc.

STATEMENTS OF CASH FLOWS
(unaudited)

(in thousands)

	For the Six Months Ended June 30, 2021	2020
Cash flows from operating activities:		
Net loss	$ (44,224)	$ (36,889)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation	1,219	390
Stock-based compensation	7,486	3,601
(Increase) decrease in:		
Receivables	(2,961)	(742)
Prepaid expenses and other current assets	5,820	6,838
Right of use asset	(721)	389
Other noncurrent assets	493	(634)
Increase (decrease) in:		
Accounts payable	22	176
Accrued expenses	(4,742)	3,320
Lease liabilities	843	(361)
Net cash used in operating activities	(36,765)	(23,912)
Cash flows from investing activities:		
Purchases of property and equipment	(2,594)	(4,000)
Net cash used in investing activities	(2,594)	(4,000)
Cash flows from financing activities:		
Proceeds from exercise of stock options	1,036	16
Issuance of common stock in connection with a public offering, net	-	88,661
Issuance of common stock in connection with at the market offerings, net	-	13,015
Net cash provided by financing activities	1,036	101,692
Net increase in cash and cash equivalents, and restricted cash	(38,323)	73,780
Cash and cash equivalents, beginning of period	115,069	79,741
Cash and cash equivalents, end of period	$ 76,746	$ 153,521
Supplementary disclosure of cash flow information:		
Accounts included in accrued expenses and accounts payable related to property and equipment	$ 258	$ 1,026

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

1. Business

Overview

ZIOPHARM Oncology, Inc., which is referred to herein as "ZIOPHARM," or the "Company," is a biopharmaceutical company seeking to develop, acquire, and commercialize, on its own or with partners, a diverse portfolio of immuno-oncology therapies.

The Company's operations to date have consisted primarily of conducting research and development and raising capital to fund those efforts. In May 2021, the Company announced that it will be winding down our existing Controlled IL-12 clinical program for the treatment of recurrent glioblastoma multiforme. The Company will continue to seek a partner for this program and have also begun exploring potential synergies between this technology and our cell therapy programs. Costs incurred during the three and six months ended June 30, 2021 under the program wind down have been immaterial. The Company's fiscal year ends on December 31.

The Company has operated at a loss since its inception in 2003 and has no recurring revenues from operations. The Company anticipates that losses will continue for the foreseeable future. As of June 30, 2021, the Company had approximately $76.7 million of cash and cash equivalents. The Company's accumulated deficit at June 30, 2021 was approximately $808.3 million. Given its current development plans, the Company anticipates cash resources at June 30, 2021, plus the $25.0 million gross debt proceeds raised in August 2021, will be sufficient to fund operations into the fourth quarter of 2022. The Company's ability to continue operations after its current cash resources are exhausted depends on its ability to obtain additional financing or to achieve profitable operations, as to which no assurances can be given. Cash requirements may vary materially from those now planned because of changes in the Company's focus and direction of its research and development programs, competitive and technical advances, patent developments, regulatory changes or other developments. If adequate additional funds are not available when required, or if the Company is unsuccessful in entering into partnership agreements for further development of its product candidates, management may need to curtail its development efforts and planned operations to conserve cash.

The Company's amended and restated certificate of incorporation authorizes it to issue 350,000,000 shares of common stock. As of July 31, 2021, there were 215,559,148 shares of common stock outstanding and an additional 34,088,731 shares of common stock reserved for issuance pursuant to outstanding stock options and warrants.

Basis of Presentation

The accompanying unaudited interim financial statements have been prepared in accordance with the instructions to Form 10-Q pursuant to the rules and regulations of the Securities and Exchange Commission, or the SEC. Certain information and note disclosures required by generally accepted accounting principles in the United States have been condensed or omitted pursuant to such rules and regulations.

It is management's opinion that the accompanying unaudited interim financial statements reflect all adjustments (which are normal and recurring) that are necessary for a fair statement of the results for the interim periods. The unaudited interim financial statements should be read in conjunction with the audited financial statements and the notes thereto for the year ended December 31, 2020, included in the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2020 filed with the SEC on March 1, 2021, or the Annual Report.

The year-end balance sheet data was derived from the audited financial statements but does not include all disclosures required by generally accepted accounting principles in the United States.

The results disclosed in the statements of operations for the three and six months ended June 30, 2021 are not necessarily indicative of the results to be expected for the full fiscal year 2021.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Although the Company regularly assesses these estimates, actual results could differ from those estimates. Changes in estimates are recorded in the period in which they become known.

The Company's most significant estimates and judgments used in the preparation of its financial statements are:

- Clinical trial expenses and other research and development expenses;
- Collaboration agreements;
- Fair value measurements of stock-based compensation; and
- Income taxes.

Impact of COVID-19 Pandemic

With the ongoing COVID-19 pandemic, the Company has implemented business continuity plans designed to address and mitigate the impact of the COVID-19 pandemic on its business and operations. The Company continues to evaluate the impact of the COVID-19 global pandemic on patients, healthcare providers and its employees, as well as its operations and the operations of its business partners and healthcare communities. In response to the COVID-19 pandemic, the Company has implemented policies at its locations to mitigate the risk of exposure to COVID-19 by its personnel, including restrictions on the number of staff in any given research and development laboratory and a work-from-home policy for non-laboratory functions, along with encouraging voluntary vaccination and voluntary sharing of vaccination data. The extent to which the COVID-19 pandemic impacts the Company's business, clinical development and regulatory efforts and the value of its common stock, will depend on future developments that are highly uncertain and cannot be predicted with confidence at this time, such as the ultimate duration of the pandemic, travel restrictions, quarantines, social distancing and business closure requirements, and the effectiveness of actions taken globally to contain and treat the disease. The global economic slowdown, the overall disruption of global healthcare systems and the other risks and uncertainties associated with the COVID-19 pandemic could have a material adverse effect on the Company's business, financial condition, results of operations and growth prospects.

Subsequent Events

The Company has evaluated subsequent events from the balance sheet date through the date on which these financial statements were issued. Except as disclosed below, the Company did not have any material subsequent events that impacted its financial statements or disclosures.

On August 6, 2021, the Company entered into a credit and security agreement with a lender (the "Term Loan Agreement"). The Term Loan Agreement provides for an initial term loan of $25.0 million funded at the closing, with an additional tranche of $25.0 million available if certain funding and clinical milestones are met by August 31, 2022. Interest on the term loan is payable monthly in arrears at an annual interest rate of the greater of 7.75% or the prime rate plus a margin of 4.5%. The term loan amortization date is April 1, 2022; provided, however, if the Company raises $50M in funding on or prior to March 31, 2022, the term loan first payment date shall automatically be extended to September 1, 2022. Further, if the Company raised $50M on or prior to March 31, 2022 and an additional $50M on or prior to August 31, 2022, the term loan amortization shall automatically be extended to September 1, 2023. The term loan maturity date is March 1, 2023; provided, however, if Company achieves the funding milestones, the term loan maturity date shall automatically be extended to August 1, 2025. There is a final payment due of 5.75%. The Company granted a warrant at the closing to purchase 432,843 shares at $2.22 per share. The Company will grant a similar warrant if it draws the second $25.0 million tranche.

2. Financings

February 2020 Public Offering

On February 5, 2020, the Company entered into an underwriting agreement with Jefferies, as representative of the several underwriters named therein, relating to the issuance and sale of 27,826,086 shares of its common stock. The price to the public in the offering was $3.25 per share, and the underwriters agreed to purchase the shares from the Company pursuant to the underwriting agreement at a purchase price of $3.055 per share.

The offering was made pursuant to the Company's effective registration statement on Form S-3ASR (File No. 333-232283) previously filed with the SEC, and a prospectus supplement thereunder. The underwriters purchased the 27,826,086 shares on February 5, 2020. The net proceeds from the offering were approximately $84.8 million after deducting underwriting discounts and offering expenses paid by the Company.

On March 10, 2020, the underwriters exercised their option to purchase an additional 1,284,025 shares. The net proceeds were approximately $3.9 million after deducting underwriting discounts and offering expenses paid by the Company.

At-the-Market Facility

In June 2019, the Company entered into an Open Market Sale Agreement, or sales agreement, with Jefferies LLC, as agent, or Jefferies, pursuant to which the Company may offer and sell, from time to time through Jefferies, shares of its common stock having an aggregate offering price of up to $100.0 million. Shares will be sold pursuant to the Company's effective registration statement on Form S-3ASR (File No. 333-232283), as previously filed with the SEC.

During the six months ended June 3, 2020, the Company sold an aggregate of 2,814,673 shares of its common stock at an average price of $4.77 per share under the ATM program. The net proceeds from sales under the ATM program were approximately $13.0 million after deducting underwriting discounts.

During the six months ended June 30, 2021, there were no sales under the Company's ATM program.

3. Summary of Significant Accounting Policies

The Company's significant accounting policies were identified in the Company's Annual Report. There have been no material changes in those policies since the filing of its Annual Report except as noted below.

New Accounting Pronouncements

In December 2019, the FASB issued ASU 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes*, which is intended to simplify various aspects related to accounting for income taxes. ASU 2019-12 removes certain exceptions to the general principles in ASC 740 and also clarifies and amends existing guidance to improve consistent application. This guidance is effective for public entities for fiscal years beginning after December 15, 2020, and for interim periods within those fiscal years. The adoption did not have a material impact on the Company's financial statements.

4. Fair Value Measurements

The Company accounts for its financial assets and liabilities using fair value measurements. The authoritative accounting guidance defines fair value, establishes a framework for measuring fair value under generally accepted accounting principles and enhances disclosures about fair value measurements. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. The fair value hierarchy is based on three levels of inputs, of which the first two are considered observable and the last unobservable, that may be used to measure fair value as follows:

- Level 1 - Quoted prices in active markets for identical assets or liabilities.
- Level 2 - Inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.
- Level 3 - Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

Assets and liabilities, measured at fair value on a recurring basis as of June 30, 2021 and December 31, 2020 were as follows:

($ in thousands)		Fair Value Measurements at Reporting Date Using		
Description	**Balance as of June 30, 2021**	**Quoted Prices in Active Markets for Identical Assets/ Liabilities (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Assets:				
Cash equivalents	$ 71,809	$ 71,809	$ —	$ —

($ in thousands)		Fair Value Measurements at Reporting Date Using		
Description	**Balance as of December 31, 2020**	**Quoted Prices in Active Markets for Identical Assets/ Liabilities (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Assets:				
Cash equivalents	$ 75,990	$ 75,990	$ —	$ —

The cash equivalents represent deposits in short-term United States treasury money market mutual funds quoted in an active market and classified as a Level 1 asset.

5. Net Loss per Share

Basic net loss per share is computed by dividing net loss by the weighted average number of shares of common stock outstanding for the period. The Company's potentially dilutive shares, which include outstanding common stock options, inducement stock options, unvested restricted stock and warrants, have not been included in the computation of diluted net loss per share for any of the periods presented as the result would be anti-dilutive. Such potentially dilutive shares of common stock consisted of the following as of June 30, 2021 and 2020, respectively:

	June 30,	
	2021	2020
Stock options	10,186,829	6,561,513
Inducement stock options	463,333	863,333
Unvested restricted stock	1,065,175	1,354,306
Warrants	22,272,727	22,272,727
	33,988,064	31,051,879

6. Related Party Transactions

Collaborations with Precigen/ PGEN

During the year ended December 31, 2018, the Company and PGEN Therapeutics, Inc. or PGEN, a wholly owned subsidiary of Precigen Inc., or Precigen, which was formerly known as Intrexon Corporation, entered into an Exclusive License Agreement (Note 7).

Collaboration with PGEN and MD Anderson

On January 13, 2015, the Company, together with Precigen, entered into the MD Anderson License with MD Anderson (which Precigen subsequently assigned to PGEN). Pursuant to the MD Anderson License, the Company, together with PGEN, hold an exclusive, worldwide license to certain technologies owned and licensed by MD Anderson including technologies relating to novel CAR T-cell therapies, non-viral gene transfer systems, genetic modification and/or propagation of immune cells and other cellular therapy approaches, Natural Killer, or NK Cells, and TCRs, arising from the laboratory of Laurence Cooper, M.D., Ph.D., who served as the Company's Chief Executive Officer from May 2015 to February 2021 and was formerly a tenured professor of pediatrics at MD Anderson. In partial consideration for entering into the MD Anderson License, the Company issued MD Anderson an aggregate of 11,722,163 shares of common stock for which the Company incurred a $67.3 million charge recorded in 2015.

During the six months ended June 30, 2021 and 2020, the Company did not make any payments to MD Anderson. The total aggregate payments made in connection with this agreement have been $41.9 million since inception. The net balance of cash resources on hand at MD Anderson available to offset expenses and future costs is $1.8 million, which is included in prepaid expenses and other current assets. The classification is based on management's current estimate of plans to utilize the prepaid balance and is subject to revision on a quarterly basis. At June 30, 2021 and December 31, 2020, the Company had accounts receivable due from MD Anderson of $7.6 million and $4.7 million, respectively.

Collaboration with Vineti Inc.

On July 9, 2020, the Company entered into a master service agreement and statement of work with Vineti, Inc., or Vineti. Pursuant to the agreements, Vineti is developing a software platform to coordinate and orchestrate the order, cell collection and manufacturing process for the Company's TCR-T clinical programs. Heidi Hagen, who became a director of the Company in June 2019 and the Interim Chief Executive Officer on February 25, 2021, is a co-founder and former officer, of Vineti. During the three and six months ended June 30, 2021, the Company recorded expenses of approximately $0.1 million and $0.3 million for services performed by Vineti, respectively.

Joint Venture with TriArm Therapeutics/Eden Biocell

On December 18, 2018, the Company entered into a Framework Agreement with TriArm Therapeutics, Ltd., or TriArm, pursuant to which the parties agreed to launch Eden BioCell, Ltd., or Eden BioCell, to lead clinical development and commercialization of certain

Sleeping Beauty-generated CAR-T therapies as set forth in a separate license agreement. Eden BioCell is a joint venture in the People's Republic of China (including Macau and Hong Kong), Taiwan and Korea. The Company licensed to Eden BioCell the rights in Greater China for its third-generation Sleeping Beauty-generated CAR-T therapies targeting the CD19 antigen. Eden BioCell is owned equally by the Company and TriArm and the parties share decision-making authority. TriArm has contributed $10.0 million to Eden BioCell. TriArm also manages all clinical development in the territory pursuant to a Master Services Agreement between TriArm and Eden BioCell. James Huang, who became a director of the Company in July 2020, Chairman of the Board of Directors in January 2021 and Executive Chairman in February 2021, was the founder and serves as managing partner of Panacea Venture, which is an investor in TriArm. Mr. Huang also serves as a member of Eden BioCell's Board of Directors.

For the six months ended June 30, 2021 and 2020, Eden Biocell incurred a net loss and the Company continues to have no commitment to fund its operations.

7. Commitments and Contingencies

License Agreements

Exclusive License Agreement with PGEN Therapeutics

On October 5, 2018, the Company entered into an exclusive license agreement, or the License Agreement, with PGEN. As between the Company and PGEN, the terms of the License Agreement replace and supersede the terms of: (a) that certain Exclusive Channel Partner Agreement by and between the Company and Precigen, dated January 6, 2011, as amended by the First Amendment to Exclusive Channel Partner Agreement effective September 13, 2011, the Second Amendment to the Exclusive Channel Partner Agreement effective March 27, 2015, and the Third Amendment to Exclusive Channel Partner Agreement effective June 29, 2016, which was subsequently assigned by Precigen to PGEN; (b) certain rights and obligations pursuant to that certain License and Collaboration Agreement effective March 27, 2015 between ZIOPHARM, Precigen and ARES TRADING S.A., or Ares Trading, a subsidiary of Merck KGaA, or Merck, as assigned by Precigen to PGEN, or the Ares Trading Agreement; (c) that certain License Agreement between the Company, Precigen, and MD Anderson, with an effective date of January 13, 2015, or the MD Anderson License, which was subsequently assigned by Precigen and assumed by PGEN effective as of January 1, 2018; and (d) that certain Research and Development Agreement between the Company, Precigen and MD Anderson with an effective date of August 17, 2015, or the Research and Development Agreement, and any amendments or statements of work thereto.

Pursuant to the terms of the License Agreement, PGEN has granted the Company exclusive, worldwide rights to research, develop and commercialize (i) products utilizing PGEN's RheoSwitch® gene switch, or RTS®, for the treatment of cancer, referred to as IL-12 Products, (ii) CAR products directed to (A) CD19 for the treatment of cancer, referred to as CD19 Products, and (B) a second target for the treatment of cancer, subject to the rights of Ares Trading to pursue such target under the Ares Trading Agreement, and (iii) T-cell receptor, or TCR, products designed for neoantigens for the treatment of cancer. PGEN has also granted the Company an exclusive, worldwide, royalty-bearing, sub-licensable license for certain patents relating to the *Sleeping Beauty* technology to research, develop and commercialize TCR products for both neoantigens and shared antigens for the treatment of cancer, referred to as TCR Products.

The Company is solely responsible for all aspects of the research, development and commercialization of the exclusively licensed products for the treatment of cancer. The Company is required to use commercially reasonable efforts to develop and commercialize IL-12 Products, CD19 Products and TCR Products.

In consideration of the licenses and other rights granted by PGEN, the Company pays PGEN an annual license fee of $0.1 million. The Company did not have any annual license expenses for the three and six months ended June 30, 2021 and 2020.

The Company will also make milestone payments totaling up to an additional $52.5 million for each exclusively licensed program upon the initiation of later stage clinical trials and upon the approval of exclusively licensed products in various jurisdictions. In addition, the Company will pay PGEN tiered royalties ranging from low-single digit to high-single digit on the net sales derived from the sales of any approved IL-12 Products and CAR Products. The Company will also pay PGEN royalties ranging from low-single digit to mid-single digit on the net sales derived from the sales of any approved TCR Products, up to a maximum royalty amount of $100.0 million in the aggregate. The Company will also pay PGEN 20% of any sublicensing income received by the Company relating to the licensed products.

PGEN will pay the Company royalties ranging from low-single digits to mid-single digits on the net sales derived from the sale of PGEN's CAR products, up to $50.0 million.

During the three months ended June 30, 2021 and June 30, 2020 there were no expenses for services performed by PGEN. During the six months ended June 30, 2021 there were $0.1 million of expenses for services performed by PGEN and no expenses incurred

during the six months ended June 30, 2020. As of June 30, 2021, the Company did not have any outstanding liabilities related to services performed by PGEN. As of December 31, 2020, the Company had $0.1 million in accrued expenses related to services for amounts due to PGEN.

License Agreement—The University of Texas MD Anderson Cancer Center

On January 13, 2015, the Company, together with Precigen, entered into the MD Anderson License with MD Anderson (which Precigen subsequently assigned to PGEN). Pursuant to the MD Anderson License, the Company, together with Precigen, holds an exclusive, worldwide license to certain technologies owned and licensed by MD Anderson including technologies relating to novel CAR T-cell therapies, non-viral gene transfer systems, genetic modification and/or propagation of immune cells and other cellular therapy approaches, Natural Killer, or NK Cells, and TCRs, arising from the laboratory of Laurence Cooper, M.D., Ph.D., who was the Company's Chief Executive Officer from May 2015 to February 2021 and was formerly a tenured professor of pediatrics at MD Anderson. On February 25, 2021, the Company announced that Dr. Cooper was stepping down from his role as Chief Executive Officer and as a member of the Board of Directors, but will be remaining with the Company in a scientific advisory consulting role to support the Company's operations. Under the of a Separation Agreement, in exchange for a release of claims and certain post-employment covenants and in lieu of any severance benefits under his employment agreement, Dr. Cooper is entitled to receive continuing payments of his base salary and COBRA premiums for a period of 18 months, a cash payment $143,250, representing a pro-rata target amount of his annual performance bonus for 2021, a fully-vested restricted stock award with a grant value of $917,000, equivalent to the 2020 annual bonus Dr. Cooper would have been entitled to had his employment not terminated, and certain limited reimbursements for legal fees and housing. Dr. Cooper is not entitled to any equity acceleration in connection with his separation, however his equity awards are eligible to continue to vest pursuant to their terms based on his consulting services to the Company .Additionally, under Dr. Cooper's consulting agreement, he may earn consulting fees in amounts of up to $0.6 million for the first year and $0.3 million for each of the following two years and is also eligible for reimbursement of reasonable out-of-pocket business expenses.

The term of the MD Anderson License expires on the later of (a) the expiration of all patents licensed thereunder, or (b) the twentieth anniversary of the date of the MD Anderson License; provided, however, that following the expiration of the term of the MD Anderson License, the Company, together with PGEN, shall have a fully-paid up, royalty free, perpetual, irrevocable and sublicensable license to use the licensed intellectual property thereunder. After ten years from the date of the MD Anderson License and subject to a 90-day cure period, MD Anderson will have the right to convert the MD Anderson License into a non-exclusive license if ZIOPHARM and PGEN are not using commercially reasonable efforts to commercialize the licensed intellectual property on a case-by-case basis. After five years from the date of the MD Anderson License and subject to a 180-day cure period, MD Anderson will had the right to terminate the MD Anderson License with respect to specific technology(ies) funded by the government or subject to a third-party contract if the Company and PGEN did not meet the diligence requirements in such funding agreement or contract, as applicable. MD Anderson may also terminate the agreement with written notice upon material breach by us and PGEN, if such breach has not been cured within 60 days of receiving such notice. In addition, the MD Anderson License will terminate upon the occurrence of certain insolvency events for both the Company and PGEN and may be terminated by the mutual written agreement of the Company, PGEN, and MD Anderson.

On August 17, 2015, the Company, Precigen and MD Anderson entered into the Research and Development, or the 2015 Agreement, to formalize the scope and process for the transfer by MD Anderson, pursuant to the terms of the MD Anderson License, of certain existing research programs and related technology rights, as well as the terms and conditions for future collaborative research and development of new and ongoing research programs.

Pursuant to the 2015 Agreement, the Company, Precigen and MD Anderson formed a joint steering committee to oversee and manage the new and ongoing research programs. Under the License Agreement with PGEN, the Company and PGEN agreed that PGEN would no longer participate on the joint steering committee after the date of the License Agreement. As provided under the MD Anderson License, the Company provided funding for research and development activities in support of the research programs under the Research and Development Agreement for a period of three years and in an amount of no less than $15.0 million and no greater than $20.0 million per year. On October 22, 2019, the Company entered into an amendment to the Research and Development Agreement extending its term until December 31, 2026.

During the three and six months ended June 30, 2021 and 2020, the Company made no payments to MD Anderson. The net balance of cash resources on hand at MD Anderson available to offset expenses and future costs is $1.8 million, which is included in prepaid expenses and other current assets on the Company's balance sheet at June 30, 2021. There were also accounts receivable of $7.6 and $4.7 million due from MD Anderson at June 30, 2021 and December 31, 2020, respectively.

On October 22, 2019, the Company entered into the 2019 Research and Development Agreement, or the 2019 Agreement, with MD Anderson, pursuant to which the parties agreed to collaborate with respect to the Company's *Sleeping Beauty* immunotherapy

program, which uses non-viral gene transfer to stably express and clinically evaluate neoantigen-specific TCRs in T cells. Under the 2019 Agreement, the parties will, among other things, collaborate on programs to expand the Company's TCR library and conduct clinical trials.

The Company will own all intellectual property developed under the 2019 Agreement and will retain all rights to intellectual property for oncology products manufactured using non-viral gene transfer technologies under the Agreement, including the Company's *Sleeping Beauty* technology. The Company has granted MD Anderson an exclusive license for such intellectual property outside the field of oncology and to develop and commercialize autologous TCR products manufactured using viral gene transfer technologies, and a non-exclusive license for allogeneic TCR products manufactured using viral-based technologies.

The Company has agreed, beginning on January 1, 2021, to reimburse MD Anderson up to a total of $20.0 million for development costs incurred starting after January 1, 2021 under the 2019 Agreement. In addition, the Company will pay MD Anderson royalties on net sales of its TCR products at rates in the low single digits. The Company is required to make performance-based payments upon the successful completion of clinical and regulatory benchmarks relating to its TCR products. The aggregate potential benchmark payments are $36.5 million, of which only $3.0 million will be due prior to the first marketing approval of the Company's TCR products. The royalty rates and benchmark payments owed to MD Anderson may be reduced upon the occurrence of certain events. The Company also agreed that it will sell the Company's TCR products to MD Anderson at preferential prices and will sell its TCR products in Texas exclusively to MD Anderson for a limited period of time following the first commercial sale of the Company's TCR products. No costs have been incurred under this agreement as of June 30, 2021.

In connection with the execution of the 2019 Agreement, the Company issued MD Anderson a warrant to purchase 3,333,333 shares of common stock. Refer to Note 10 – *Warrants* for further details.

License Agreement with the National Cancer Institute

On May 28, 2019, the Company entered into a patent license agreement, or the Patent License, with the National Cancer Institute, or the NCI. Pursuant to the Patent License, the Company holds an exclusive, worldwide license to certain intellectual property to develop and commercialize patient-derived (autologous), peripheral blood T-cell therapy products engineered by transposon-mediated gene transfer to express TCRs reactive to mutated KRAS, TP53 and EGFR. In addition, pursuant to the Patent License, the Company holds an exclusive, worldwide license to certain intellectual property for manufacturing technologies to develop and commercialize autologous, peripheral blood T-cell therapy products engineered by non-viral gene transfer to express TCRs, as well as a non-exclusive, worldwide license to certain additional manufacturing technologies.

Pursuant to the terms of the Patent License, the Company is required to pay the NCI a cash payment in the aggregate amount of $1.5 million, payable in $0.5 million installments within sixty days, six-months, and the twelve-month anniversary of the effective date of the agreement of the Patent License. The $1.5 million was paid as of December 31, 2020.

On January 8, 2020, the Company entered into an amendment to the Patent License which expanded the TCR library to include additional TCRs reactive to mutated KRAS and TP53.

The terms of the Patent License also require the Company to pay the NCI minimum annual royalties in the amount of $0.3 million, which amount will be reduced to $0.1 million once the aggregate minimum annual royalties paid by the Company equals $1.5 million. The first minimum annual royalty payment is payable on the date that is eighteen months following the date of the Patent License. This payment was expensed during the first quarter of 2021.

On September 28, 2020, the Company entered into a second amendment to the patent license agreement which expanded the TCR library to include additional TCRs.

On April 16, the Company entered into a third amendment to the patent license agreement which modified the terms governing termination, modification and surrender of rights under the license.

On May 4, 2021, the Company entered into a fourth amendment to the patent license agreement which expanded the TCR library to include additional TCRs.

The Company is also required to make performance-based payments upon successful completion of clinical and regulatory benchmarks relating to the licensed products. The aggregate potential benchmark payments are $4.3 million, of which aggregate payments of $3.0 million are due only after marketing approval in the United States or in Europe, Japan, Australia, China or India. The first benchmark payment of $0.1 million will be due upon the initiation of the Company's first sponsored Phase 1 clinical trial of a licensed product or licensed process in the field of use licensed under the Patent License, which has not been met at June 30, 2021.

In addition, the Company is required to pay the NCI one-time benchmark payments following aggregate net sales of licensed products at certain net sales up to $1.0 billion. The aggregate potential amount of these benchmark payments is $12.0 million. The Company must also pay the NCI royalties on net sales of products covered by the Patent License at rates in the low to mid-single digits depending upon the technology included in a licensed product. To the extent the Company enters into a sublicensing agreement relating to a licensed product, the Company is required to pay the NCI a percentage of all consideration received from a sublicensee, which percentage will decrease based on the stage of development of the licensed product at the time of the sublicense.

The Patent License will expire upon expiration of the last patent contained in the licensed patent rights, unless terminated earlier. The NCI may terminate or modify the Patent License in the event of a material breach, including if the Company does not meet certain milestones by certain dates, or upon certain insolvency events that remain uncured following the date that is 90 days following written notice of such breach or insolvency event. The Company may terminate the Patent License, or any portion thereof, in the Company's sole discretion at any time upon 60 days' written notice to the NCI. In addition, the NCI has the right to: (i) require the Company to sublicense the rights to the product candidates covered by the Patent License upon certain conditions, including if the Company is not reasonably satisfying required health and safety needs and (ii) terminate or modify the Patent License, including if the Company is not satisfying requirements for public use as specified by federal regulations.

During the three and six month periods ended June 30, 2021, the Company expensed $0.1 million and $0.3 million related to the patent services under this agreement. The Company did not incur expenses related to patent services during the three and six month periods ended June 30, 2020. Additionally, the Company recorded $0.3 million in accrued expenses as of June 30, 2021 related to patent services.

Cooperative Research and Development Agreement (CRADA) with the National Cancer Institute

On January 10, 2017, the Company announced the signing of a CRADA, with the NCI for the development of adoptive cell transfer, or ACT,-based immunotherapies genetically modified using the *Sleeping Beauty* transposon/transposase system to express TCRs for the treatment of solid tumors. The principal goal of the CRADA is to develop and evaluate ACT for patients with advanced cancers using autologous peripheral blood lymphocytes, or PBL, genetically modified using the non-viral *Sleeping Beauty* system to express TCRs that recognize neoantigens expressed within a patient's cancer. Research conducted under the CRADA will be at the direction of Steven A. Rosenberg, M.D., Ph.D., Chief of the Surgery Branch at the NCI, in collaboration with the Company. In February 2019, the Company extended the CRADA with the NCI for two years, committing an additional $5.0 million to this program. The Company recorded $1.3 million of expense for both six-month periods ended June 30, 2021 and 2020 and $0.6 million of expenses for both three-month periods ended June 30, 2021 and 2020 respectively.

Patent and Technology License Agreement—The University of Texas MD Anderson Cancer Center and the Texas A&M University System

On August 24, 2004, the Company entered into a patent and technology license agreement with MD Anderson and the Texas A&M University System, which the Company refers to, collectively, as the Licensors. Under this agreement, the Company was granted an exclusive, worldwide license to rights (including rights to U.S. and foreign patent and patent applications and related improvements and know-how) for the manufacture and commercialization of two classes of organic arsenicals (water- and lipid-based) for human and animal use. The class of water-based organic arsenicals includes darinaparsin.

Under the terms of the agreement, the Company may be required to make additional payments to the Licensors upon achievement of certain other milestones in varying amounts which, on a cumulative basis could total up to an additional $4.5 million. In addition, the Licensors are entitled to receive single digit percentage royalty payments on sales from a licensed product and will also be entitled to receive a portion of any fees that the Company may receive from a possible sublicense under certain circumstances. No amounts were accrued or paid during the three or six months ended June 30, 2021 and 2020.

Collaboration Agreement with Solasia Pharma K.K.

On March 7, 2011, the Company entered into a License and Collaboration Agreement with Solasia Pharma K.K., or Solasia, which was amended on July 31, 2014 to include an exclusive worldwide license. Pursuant to the License and Collaboration Agreement, the Company granted Solasia an exclusive license to develop and commercialize darinaparsin in both intravenous and oral forms and related organic arsenic molecules, in all indications for human use.

As consideration for the license, the Company is eligible to receive from Solasia development- and sales-based milestones, a royalty on net sales of darinaparsin, once commercialized, and a percentage of any sublicense revenues generated by Solasia. Solasia will be responsible for all costs related to the development, manufacturing and commercialization of darinaparsin. The Company's Licensors, as defined in the agreement, will receive a portion of all milestone and royalty payments made by Solasia to the Company in

accordance with the terms of the license agreement with the Licensors. No amounts were received during the three or six months ended June 30, 2021 and 2020.

Collaboration with KBI

On July 9, 2020, the Company entered into a master service agreement and statement of work with KBI Biopharma, a contract manufacturing organization serving the biotechnology industry, including cell therapy. Pursuant to the agreements, KBI will provide cGMP cell therapy manufacturing and testing for the Company's library TCR-T cell clinical program.

Collaboration with Aldevron

On March 3, 2019, the Company entered into a master services agreement with Aldevron, a plasmid DNA manufacturer. On June 25, 2020 Aldevron announced an agreement for Aldevron to produce DNA plasmids under their neoGMP® service to be utilized in the manufacture of the Company's TCR-T cell therapies for treatment of solid tumors.

8. Leases

In June 2012, the Company entered into a master lease for the Company's corporate office headquarters in Boston, Massachusetts, which was originally set to expire in August 2016, but renewed through August 31, 2021. As of June 30, 2021 and December 31, 2020, a total security deposit of $0.1 million is included in deposits on the Company's balance sheet.

On January 30, 2018, the Company entered into a lease agreement for office space in Houston, Texas, at MD Anderson. Under the terms of the Houston lease agreement, the Company leased approximately 210 square feet and were required to make rental payments at an average monthly rate of approximately $1 thousand. This lease was terminated effective March 31, 2020.

On January 30, 2018, the Company entered into a lease agreement, or the First Houston Lease, for office space in Houston, Texas at MD Anderson through April 2021. On March 12, 2019, the Company entered into a lease agreement, or the Second Houston Lease, for additional office space in Houston through April 2021. Under the terms of the First Houston Lease agreement, the Company leases approximately 1,038 square feet and is required to make rental payments at an average monthly rate of approximately $2 thousand through April 2021. Under the terms of the Second Houston Lease, the Company leases from MD Anderson, approximately 8,443 square feet and is initially required to make rental payments of approximately $17 thousand per month through February 2027, subject to an annual base rent increase of approximately 3.0% throughout the term. Effective April 13, 2020, the Company leased an additional 5,584 square feet from MD Anderson. The Company is initially required to make rental payments of approximately $12 thousand per month through February 2027, subject to an annual base rent increase of approximately 3.0% throughout the term. All future rent expense incurred in Houston, will be deducted from the Company's prepayments to MD Anderson.

Effective December 15, 2020, the Company leased an additional 35,482 square feet from MD Anderson. The Company is initially required to make rental payments of approximately $37 thousand per month through April 2028, subject to an annual base rent increase of approximately 3.0% throughout the term beginning in April 2023. Future rent expense incurred in Houston, will be deducted from the Company's prepayments to MD Anderson.

On April 22, 2021, the Company extended its lease for a 9,800 square foot portion of its corporate office headquarters in Boston. The renewal for its corporate office headquarters was originally set to expire on August 31, 2021, but has now been extended through August 2026. Under the terms of the renewal, the Company is required to make rental payments of approximately $26 thousand per month.

The components of lease expense were as follows:

	Three Months Ended June 30,		For the Six Months Ended June 30,	
(in thousands)	2021	2020	2021	2020
Operating lease cost	$ 380	$ 236	$ 761	$ 471
Total lease cost	$ 380	$ 236	$ 761	$ 471
Weighted-average remaining lease term (years)	6.00	4.36	6.00	4.36
Weighted-average discount rate	8.00%	8.00%	8.00%	8.00%

Effective June 1, 2020, the Company entered into a noncancelable lease for a period of less than a year with monthly payments of approximately $10 thousand that is not subject to right of use asset recognition under ASC 842. Effective September 1, 2020, the Company added additional space to the noncancelable lease for a period of less than a year with monthly payments now totaling

approximately $15 thousand. Rent expense during the three and six months ended June 30, 2021 was $5 thousand. As of June 30, 2021, this lease has been terminated and the Company has no further obligation.

As of June 30, 2021, the maturities of the Company's operating lease liabilities for the years ended December 31, were as follows (in thousands):

2021 (excluding the six months ended June 30, 2021)	$ 617
2022	1,102
2023	1,132
2024	1,166
2025	1,201
Thereafter	1,873
Total lease payments	7,091
Less: Imputed interest and adjustments	(1,435)
Present value of lease payments	$ 5,656

9. Stock-Based Compensation

The Company recognized stock-based compensation expense on all employee and non-employee awards as follows:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(in thousands)	2021	2020	2021	2020
Research and development	847	535	1,580	1,065
General and administrative	4,443	1,126	5,906	2,536
Stock-based compensation expense	$ 5,290	$ 1,661	$ 7,486	$ 3,601

The Company granted an aggregate of 41,500 and 4,395,438 stock options during the three and six months ended June 30, 2021 with a weighted-average grant date fair value of $2.27 and $2.44 per share, respectively. The Company granted an aggregate of 153,000 and 1,049,000 stock options during the three and six months ended June 30, 2020 with a weighted-average grant date fair value of $1.99 and $2.55 per share, respectively.

On March 4, 2021, the Company extended the contractual life of 216,700 fully vested stock options held by a former director of the Company. On April 5, 2021, the Company extended the contractual life of 751,371 stock options and accelerated the vesting of 226,889 shares of restricted stock held by a former officer of the Company. On April 29, 2021, the Company extended the contractual life of 10,417 vested and 167,023 unvested stock options and accelerated the vesting of 4,137 shares of restricted stock held by a former director. On May 17, 2021, the Company extended the contractual life of 347,267 vested stock options held by a former officer of the Company. These extensions resulted in additional stock compensation expense of approximately $1.9 million and $2.0 million during the three and six months ended June 30, 2021, respectively.

For the three months ended June 30, 2021 and 2020, the fair value of stock options was estimated on the date of grant using a Black-Scholes option valuation model with the following assumptions:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
	2021	2020	2021	2020
Risk-free interest rate	1.15%	0.43 - 0.60%	0.09-1.15%	0.43 - 1.68%
Expected life in years	6.25	6-6.25	5.50 - 6.25	6 - 6.25
Expected volatility	74.08%	73.10 - 73.90%	72.92 -74.80%	71.11 - 73.74%
Expected dividend yield	—%	—%	—%	—%

At June 30, 2021, there were 463,333 stock options that had been issued outside the 2012 Equity Incentive Plan, or the 2012 Plan and the 2020 Equity Incentive Plan, or the 2020 Plan. These options are excluded from the schedule below.

Stock option activity under the Company's stock option plans for the three months ended June 30, 2021 is as follows:

(in thousands, except share and per share data)	Number of Shares	Weighted-Average Exercise Price	Weighted-Average Contractual Term (Years)	Aggregate Intrinsic Value
Outstanding, December 31, 2020	6,840,719	$ 3.81		
Granted	4,395,438	3.79		
Exercised	(363,109)	2.86		
Cancelled	(686,219)	3.86		
Outstanding, June 30, 2021	10,186,829	$ 3.83	8.27	$ 899
Options exercisable, June 30, 2021	4,970,314	$ 4.13	7.23	$ 771
Options exercisable, December 31, 2020	3,596,315	$ 4.17	6.90	$ 598
Options available for future grant	1,427,152			

At June 30, 2021, total unrecognized compensation costs related to unvested stock options outstanding amounted to $11.3 million. The cost is expected to be recognized over a weighted-average period of 1.82 years.

A summary of the status of unvested restricted stock for the three months ended June 30, 2021 is as follows:

	Number of Shares	Weighted-Average Grant Date Fair Value
Unvested, December 31, 2020	786,280	$ 3.08
Granted	726,224	3.75
Vested	(325,238)	3.58
Cancelled	(122,091)	3.61
Unvested, June 30, 2021	1,065,175	$ 3.32

At June 30, 2021, total unrecognized compensation costs related to unvested restricted stock outstanding amounted to $2.2 million. The cost is expected to be recognized over a weighted-average period of 1.68 years.

At the Company's annual meeting held on June 29, 2020, the shareholders approved the 2020 Equity Incentive Plan, or the 2020 Plan, which is a successor to and continuation of the 2012 Plan. The 2020 Plan had 21 million shares authorized, plus the shares remaining for issuance under the 2012 Plan. Our ability to utilize the total shares authorized under the 2020 Plan will be limited by the total number of shares authorized in our certificate of incorporation. As a result, as of June 30, 2021, there are 1,427,152 shares available to grant from the 2020 Plan. No additional awards can be granted from the 2012 Plan or the Company's 2003 Stock Option Plan.

10. Warrants

In connection with the Company's November 2018 private placement which provided net proceeds of approximately $47.1 million, the Company issued warrants to purchase an aggregate of 18,939,394 shares of common stock, or the 2018 warrants, which became exercisable six months after the closing of the private placement. The warrants have an exercise price of $3.01 per share and have a five-year term. The relative fair value of the warrants was estimated at $18.4 million using a Black-Scholes model with the following assumptions: expected volatility of 71%, risk free interest rate of 2.99%, expected life of five years and no dividends.

The Company assessed whether the warrants require accounting as derivatives. The Company determined that the warrants were (1) indexed to the Company's own stock and (2) classified in stockholders' equity in accordance with Financial Accounting Standards Board, or (FASB) Accounting Standards Codification ("ASC") Topic 815, *Derivatives and Hedging*. As such, the Company has concluded the warrants meet the scope exception for determining whether the instruments require accounting as derivatives and should be classified in stockholders' equity.

On July 26, 2019 and September 12, 2019, the Company entered into agreements with existing investors for the exercise of previously issued warrants to purchase common stock in the private placement. Pursuant to the terms of the agreements, investors exercised their 2018 warrants for an aggregate of 17,803,031 shares of common stock, at an exercise price of $3.01 per share. Proceeds from the warrant exercise, after deducting placement agent fees and other related expenses of $1.1 million were approximately $52.5 million. The Company issued participating investors new warrants to purchase up to 17,803,031 additional shares of common stock, or the 2019 warrants, as an inducement for the warrant holders to exercise their 2018 warrants. The 2019 warrants will expire on the fifth

anniversary of the initial exercise date and have an exercise price of $7.00. The 2019 warrants were valued using a Black-Scholes valuation model and resulted in a $60.8 million non-cash charge to the Company's statement of operations in 2019.

On October 22, 2019, the Company entered into the 2019 Agreement with MD Anderson. Refer to Note 7 – *Commitments and Contingencies* for further details. In connection with the execution of the 2019 Agreement, the Company issued MD Anderson a warrant to purchase 3,333,333 shares of common stock. The warrant has an initial exercise price of $0.001 per share and grant date fair value of $14.5 million. The warrant expires on December 31, 2026 and vests upon the occurrence of certain clinical milestones. The Company will recognize expense on the warrant in the same manner as if the Company paid cash for services to be rendered. The Company has not recognized any expense related to the warrant as of June 30, 2021, as no work towards any of the specified clinical milestones has begun.

11. Joint Venture

On December 18, 2018, the Company entered into a Framework Agreement with TriArm pursuant to which the parties agreed to launch Eden BioCell, to lead clinical development and commercialization of certain *Sleeping Beauty*-generated CAR-T therapies as set forth in a separate license agreement (see Note 6).

On January 3, 2019, Eden BioCell was incorporated in Hong Kong as a private company. Eden BioCell, the Company and TriArm entered into a Share Subscription Agreement on January 23, 2019, where the Company and TriArm agreed to contribute certain intellectual property, services and cash (only with respect to TriArm) to Eden BioCell to subscribe for a certain number of newly issued ordinary shares in the share capital of Eden BioCell. On the closing date, upon the issuance and subscription of the shares, in respect of the aforementioned consideration, 10,000,000 ordinary shares were issued to the Company and 10,000,000 ordinary shares were issued to TriArm.

The closing of the transaction occurred on July 5, 2019. The Framework Agreement and Share Subscription Agreements were each respectively amended to be effective as of this date. Upon consummation of the joint venture, Eden BioCell and the Company also entered into a license agreement, pursuant to which the Company licensed the rights to Eden BioCell for third-generation *Sleeping Beauty*-generated CAR-T therapies targeting the CD19 antigen for the territory of China (including Macau and Hong Kong), Taiwan and Korea. Eden BioCell will be responsible for certain milestone and royalty payments related to the Company's license agreements with MD Anderson and PGEN (see Note 7). TriArm entered into a master services agreement with Eden BioCell and contributed $10.0 million of cash on the closing date. TriArm and the Company each received a 50% equity interest in the joint venture in exchange for their contributions to Eden BioCell.

As of July 5, 2019, as a result of the design and purpose of Eden BioCell, the Company determined that Eden BioCell was considered a variable interest entity, or VIE, and concluded that it is not the primary beneficiary of the VIE as it did not have the power to direct the activities of the VIE that most significantly impact its performance. Rather, the Company accounts for the equity interest in Eden BioCell under the equity method of accounting as it has the ability to exercise significant influence over the operations of Eden BioCell.

The Company determined that Eden BioCell was not a customer and therefore, accounted for the transaction as the transfer of nonfinancial assets to be recognized at their fair value on the contribution date. The fair value of the intellectual property contributed to Eden BioCell had a de minimis value due to the early stage of the technology and the likelihood of clinical success. Due to the de minimis fair value of the intellectual property contributed, the Company did not record a gain or loss on this transaction and recognized no value for its equity-method investment.

In March 2021 and as announced by the Company in April 2021, Eden BioCell, the Company's Joint Venture in Taiwan with Tri-Arm Therapeutics, began treating patients in a clinical trial with the Company's investigational CD19 RPM CAR-T cell therapy, under the IND cleared by the Taiwan FDA in December. Two patients have now been treated in this trial. The lead investigator at National Taiwan University in Taipei, has reported no serious adverse safety events in either of these patients. Laboratory results continue to support, as previously published, that non-viral Sleeping Beauty gene transfer is effective in genetically modifying autologous T-cells. Patients were infused two days after gene transfer, thus shortening the turnaround time and demonstrating an advantage over viral methods.

Based on laboratory data from the first two patients generated between March and May 2021, the Tri-Arm/Eden team concluded, in concert with the investigator and the team at Ziopharm, that further process development work is required. This additional work will optimize and refine the manufacturing process in order to more consistently manufacture product in the desired clinical dose range seeking to be studied.

The Tri-Arm/Eden team, per the terms of the JV agreement, will undertake the necessary process development work before infusing additional patients. This will take an unspecified amount of time. Additionally, the ongoing COVID outbreak in Taiwan presents additional uncertainty to the timeline, as the operational activities in the manufacturing suite are currently slowed due to employee restrictions related to the pandemic. These restrictions are impacting clinical trials broadly in Taiwan.

For the three and six months ended June 30, 2021 and 2020, Eden BioCell incurred a net loss and the Company continues to have no commitment to fund its operations.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following information should be read in conjunction with our unaudited condensed financial statements and the notes thereto included in this Quarterly Report on Form 10-Q and the audited financial information and the notes thereto included in our Annual Report on Form 10-K, which was filed with the Securities and Exchange Commission, or the SEC, on March 1, 2021, or the Annual Report.

Except for the historical information contained herein, the matters discussed in this Quarterly Report on Form 10-Q may be deemed to be forward-looking statements that involve risks and uncertainties. We make such forward-looking statements pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and other federal securities laws. In this Quarterly Report on Form 10-Q, words such as "may," "expect," "anticipate," "estimate," "intend," "plan," and similar expressions (as well as other words or expressions referencing future events, conditions or circumstances) are intended to identify forward-looking statements.

Our actual results and the timing of certain events may differ materially from the results discussed, projected, anticipated, or indicated in any forward-looking statements. We caution you that forward-looking statements are not guarantees of future performance and that our actual results of operations, financial condition and liquidity, and the development of the industry in which we operate may differ materially from the forward-looking statements contained in this Quarterly Report. In addition, even if our results of operations, financial condition and liquidity, and the development of the industry in which we operate are consistent with the forward-looking statements contained in this Quarterly Report, they may not be predictive of results or developments in future periods.

The following information and any forward-looking statements should be considered in light of factors discussed elsewhere in this Quarterly Report on Form 10-Q, including those risks identified under Part II, Item 1A. Risk Factors.

We caution readers not to place undue reliance on any forward-looking statements made by us, which speak only as of the date they are made. We disclaim any obligation, except as specifically required by law and the rules of the SEC, to publicly update or revise any such statements to reflect any change in our expectations or in events, conditions or circumstances on which any such statements may be based, or that may affect the likelihood that actual results will differ from those set forth in the forward-looking statements.

Overview

We are a clinical-stage biopharmaceutical company focused on discovering, developing and commercializing next generation immuno-oncology platforms that leverage cell- and gene-based therapies to treat patients with cancer. We are developing platform technologies that utilize the immune system by employing innovative cell engineering and novel, controlled gene expression technologies designed to deliver safe and effective cell and gene therapies for the treatment of multiple cancer types. Our major platform and priority is referred to as Sleeping Beauty and is based on the non-viral genetic engineering of immune cells using a transposon/transposase system that is intended to stably engineer T cells outside of the body for subsequent infusion. Our second platform is referred to as Controlled IL-12 and is designed to stimulate expression of interleukin 12, or IL-12, a master regulator of the immune system, in a controlled manner to focus the patient's immune system to more effectively attack cancer cells.

Using our Sleeping Beauty platform, we are developing T cell receptor, or TCR, T cell therapies to target neoantigens in solid tumors using two approaches, which we refer to as our "Library TCR-T Approach" and our "Personalized TCR-T Approach." The Library TCR-T Approach uses TCRs identified from third parties that have been prepared before the patient-recipient has been identified (i.e., as off-the-shelf inventory plasmids). We then genetically modify the recipient's own T cells to redirect specificity to public, or shared, neoantigens. The Personalized TCR-T Approach uses recipient-derived (autologous) TCRs to genetically modify the recipient's own T cells to redirect specificity to the recipient's private neoantigens. In our company-sponsored Phase 1/2 clinical trial, we will evaluate TCRs from our library for the investigational treatment of lung, cholangiocarcinoma, pancreatic, colorectal and gynecological cancers. Initially, six curated TCRs reactive to mutated KRAS and TP53 will be included in the clinical trial; however, we expect to expand the number of TCRs to be evaluated in this clinical trial. This clinical trial is being conducted in collaboration with The University of Texas MD Anderson Cancer Center, or MD Anderson, which will be the first site for the clinical trial.

Under our Cooperative Research and Development Agreement, the National Cancer Institute, or NCI, is conducting a Phase 2 Personalized TCR-T clinical trial to evaluate autologous peripheral blood lymphocytes genetically modified with the Sleeping Beauty system to express private neoantigen-specific TCRs. The trial is designed to enroll patients with a broad range of solid tumors. The U.S. Food and Drug Administration, or the FDA, has cleared the investigational new drug, or IND, application submitted by the NCI for this clinical trial. However, enrollment in this clinical trial has been temporarily suspended due to issues internal to the NCI and unrelated to our technology. The progress and timeline for this trial, including the timeline for dosing patients, are under the control of the NCI.

We are developing chimeric antigen receptor, or CAR, T cell, or CAR+ T, therapies targeting CD19 on malignant B cells using our Sleeping Beauty platform. We are advancing our rapid personalized manufacture, or RPM, technology in Greater China with Eden BioCell, Ltd., or Eden BioCell, our joint venture with TriArm Therapeutics, Ltd. RPM enables small numbers of T cells to be infused as soon as the day after gene transfer which is made possible by the genetic modification of resting T cells to express CAR and membrane bound IL-15, or mbIL15. Eden BioCell is conducting a Phase 1 clinical trial in Taiwan to evaluate the safety and efficacy of Sleeping Beauty-generated CD19-specific RPM CAR+ T therapies using patient-derived (autologous) T cells in order to treat patients with relapsed or refractory CD19 + leukemias and lymphomas.

Our Controlled IL-12 platform is based on an engineered replication-incompetent adenovirus, referred to as Ad-RTS-hIL-12, plus veledimex as a gene delivery system to conditionally produce IL-12, a potent, naturally occurring anti-cancer protein, to treat patients with solid tumors. Our Controlled IL-12 platform allows us to deliver IL-12 in a tunable dose as the cytokine is under transcriptional control of the RheoSwitch Therapeutic System®(RTS ®).

We have not generated significant revenue and have incurred significant net losses in each year since our inception. For the six months ended June 30, 2021, we had a net loss of $44.2 million, and, as of June 30, 2021, we have incurred approximately $808.3 million of accumulated deficit since our inception in 2003. We expect to continue to incur significant operating expenditures and net losses. Further development of our product candidates will likely require substantial increases in our expenses as we:

- continue to undertake clinical trials for product candidates;
- seek regulatory approvals for product candidates;
- work with regulatory authorities to identify and address program-related inquiries;
- implement additional internal systems and infrastructure;
- hire additional personnel; and
- scale-up the formulation and manufacturing of our product candidates.

We continue to seek additional financial resources to fund the further development of our product candidates. If we are unable to obtain sufficient additional capital, one or more of these programs could be delayed, and we may be unable to continue our operations at planned levels and be forced to reduce our operations. Because of the numerous risks and uncertainties associated with product development, we are unable to predict the timing or amount of increased expenses or when or if we will be able to achieve or maintain profitability.

Recent Developments

The ongoing COVID-19 global pandemic has presented a significant health and economic challenge around the world and is affecting our employees, partners and business operations. The full extent to which the COVID-19 pandemic will directly or indirectly impact our business, results of operations and financial condition will depend on future developments that are highly uncertain and cannot be accurately predicted. We have implemented work-from-home policies for non-laboratory functions in response to the COVID-19 pandemic. The effects of our work-from-home policies may negatively impact productivity, disrupt our business and delay our clinical programs and timelines, the magnitude of which will depend, in part, on the length and severity of the restrictions and other limitations on our ability to conduct our business in the ordinary course. These and similar, and perhaps more severe, disruptions in our operations could negatively impact our business, operating results and financial condition. We continue to work with our partners to mitigate the impact the COVID-19 pandemic is having on our business.

Clinical, Manufacturing, Scientific, and Regulatory Developments

In February 2021, the FDA cleared our company-sponsored IND application for a Phase 1/2 clinical trial evaluating TCRs from our library for the investigational treatment of lung, cholangiocarcinoma, pancreatic, colorectal and gynecological cancers. The screening study is now open and we are actively identifying patients who may be eligible for our sponsored clinical treatment trial. We anticipate dosing of the first patient in the clinical treatment study in the second half of 2021.

The clinical treatment trial will be opened for enrollment once clinical manufacturing readiness has been established. During 2020, we successfully transferred the manufacturing process to KBI, a contract manufacturing organization with cGMP cell therapy manufacturing facilities in The Woodlands, TX. TCR-T batch data generated at both KBI and Ziopharm's own laboratory were the basis of the CMC portion of the IND filing. KBI is working to complete the process qualification and aseptic process validation to facilitate clinical manufacturing. In addition, Ziopharm has been working to build and open its own cGMP clinical production unit (CPU). Commissioning of the CPU, as well as aseptic process validation, were completed in the last quarter. The company is

completing process qualification which will support the opening of the facility in the fourth quarter of 2021 to manufacture TCR-T cells for the clinical trial.

We continue to qualify TCRs in its library and will amend the IND at the appropriate time to include these additional TCRs. We expect that the additional TCRs will expand the potential utility and applicable patient population for the Library and may include additional KRAS and / or TP53 mutations or other genetic hotspots associated with solid tumors such as EGFR. The Company plans on providing a comprehensive update on the Library later this year, including plans to expand the number of TCRs in the Library.

During the second quarter of 2021, we presented a poster at the annual American Association of Cancer Research (AACR) meeting, entitled “Hotspot mutations in KRAS and TP53 targeted by TCR-T cells genetically modified with the Sleeping Beauty transposon/transposase system”. The poster highlighted preclinical work regarding our TCR-T program and demonstrated that multiple TCRs with unique specificities targeting recurrent p53 and KRAS substitutions in frequent HLA haplotypes could be stably expressed using Sleeping Beauty transposition to re-direct peripheral blood T-cells towards tumor cells.

In March 2021 and as announced by in April 2021, Eden BioCell, our Joint Venture in Taiwan with Tri-Arm Therapeutics, began treating patients in a clinical trial with our investigational CD19 RPM CAR-T cell therapy, under the IND cleared by the Taiwan FDA in December. Two patients have now been treated in this trial. The lead investigator at National Taiwan University in Taipei, has reported no serious adverse safety events in either of these patients. Laboratory results continue to support, as previously published, that non-viral Sleeping Beauty gene transfer is effective in genetically modifying autologous T-cells. Patients were infused two days after gene transfer, thus shortening the turnaround time and demonstrating an advantage over viral methods.

Based on laboratory data from the first two patients generated between March and May 2021, the Tri-Arm/Eden team concluded, in concert with the investigator and the team at Ziopharm, that further process development work is required. This additional work will optimize and refine the manufacturing process in order to more consistently manufacture product in the desired clinical dose range seeking to be studied.

The Tri-Arm/Eden team, per the terms of the JV agreement, will undertake the necessary process development work before infusing additional patients. This will take an unspecified amount of time. Additionally, the ongoing COVID outbreak in Taiwan presents additional uncertainty to the timeline, as the operational activities in the manufacturing suite are currently slowed due to employee restrictions related to the pandemic. These restrictions are impacting clinical trials broadly in Taiwan.

The structure of the Joint Venture, which is 100% financially supported via investment from Tri-Arm, is beneficial, because it allows us to continue to focus all efforts and capital on the TCR program, which is the focus of our strategy and represents much larger potential commercial opportunity. Our resources continue to be prioritized on our TCR program.

As previously described, the TCR and CAR-T processes are distinctly different and have followed very different process development pathways. While both involve Sleeping Beauty gene transfer, the constructs, and manufacturing processes are very distinct. Additionally, the TCR-T clinical program is investigating treatment of a range of solid tumors whereas the CAR-T program has been focused on hematological malignancies.

MD Anderson has closed the CD19 RPM CAR-T Allogeneic Phase I clinical trial and withdrew the IND as of June 2021.

We are winding down our existing Controlled IL-12 clinical program for the treatment of recurrent glioblastoma multiforme. These trials examine the effect of Controlled IL-12 as a monotherapy and in combination with blockade of the immune checkpoint protein PD-1. We will continue seeking a partner for this program and have also begun exploring potential synergies between this technology and our cell therapy programs.

Appointment of Personnel

In March 2021, Kevin Buchi notified the Board of his intention not to stand for re-election as a director when his term expires at our 2021 annual meeting of stockholders on May 19, 2021. The size of the Board decreased from eight to seven directors effective as of the date of Mr. Buchi’s resignation.

Financial Overview

Overview of Results of Operations

Three and Six Months Ended June 30, 2021 Compared to Three and Six Months Ended June 30, 2020

Research and development expenses. Research and development expenses during the three and six months ended June 30, 2021 and 2020 were as follows:

	Three months ended June 30,				Six months ended June 30,			
	2021	2020	Change		2021	2020	Change	
($ in thousands)								
Research and development	$ 13,570	$ 12,051	$ 1,519	13%	$ 26,906	$ 24,757	$ 2,149	9%

Research and development expenses for the three months ended June 30, 2021 increased by $1.5 million when compared to the three months ended June 30, 2020. The increase in research and development expenses for the three months ended June 30, 2021 is primarily due to a $3.0 million increase in headcount, stock compensation, and facilities costs related to the expansion of personnel focused on TCR efforts and commissioning of our cGMP CPU as well as an increase of $2.2 million of Cell Therapy program related costs. The increase in employee and build-out costs was offset by a reduction of approximately $3.7 million in reduced third party costs as we wind down our Controlled IL-12 program.

Research and development expenses for the six months ended June 30, 2021 increased by $2.1 million when compared to the six months ended June 30, 2020. The increase in research and development expenses for the six months ended June 30, 2021 is primarily due to a $6.4 million increase in headcount, stock compensation, and facilities costs related to the expansion of personnel focused on TCR efforts and commissioning of our cGMP CPU and an increase of $3.0 million related to Cell Therapy costs. The $9.4 million dollar increase was offset by approximately $7.3 million of decreased Controlled IL-12 program costs.

Our research and development expense consists primarily of salaries and related expenses for personnel, costs of contract manufacturing services, costs of facilities and equipment, fees paid to professional service providers in conjunction with our clinical trials, fees paid to contract research organizations in conjunction with preclinical animal studies, costs of materials used in research and development, consulting, license and milestone payments and sponsored research fees paid to third parties.

We have not accumulated and tracked our internal historical research and development costs or our personnel and personnel-related costs on a program-by-program basis. Our employee and infrastructure resources are allocated across several projects, and many of our costs are directed to broadly applicable research endeavors. As a result, we cannot state the costs incurred for each of our programs on a program-by-program basis related to personnel and personnel related costs.

We do track our accumulated costs by program for costs incurred by outside vendors conducting research for our named clinical candidates. For the three months ended June 30, 2021, our clinical stage projects included a Phase 1/2 clinical trial evaluating TCRs from our library for the investigational treatment of long cholangiocarinoma, pancreatic, colorectal and gynecological cancers, a Phase 1 clinical trial with Ad-RTS-IL-12 plus veledimex in progressive glioblastoma; a Phase 1 clinical trial infusing our 2nd generation CD19-specific CAR$^+$ T cells in patients with advanced lymphoid malignancies; a Phase 1/2 clinical trial of Ad-RTS-hIL-12 with veledimex for the treatment of pediatric brain tumors; and a Phase 2 clinical trial of Ad-RTS-hIL-12 with veledimex in combination with cemiplimab-rwlc in progressive glioblastoma. The expenses incurred by us to third parties for our Phase 1/2 clinical trial evaluating TCRs from our library for the investigational treatment of long cholangiocarinoma, pancreatic, colorectal and gynecological cancers were $4.4 million for the three months ended June 30, 2021 and $7.0 million from the project's inception in February 2021 through June 30, 2021. The expense incurred by us to third parties for our Phase 2 clinical trial of Ad-RTS-hIL-12 with veledimex in combination with cemiplimab-rwlc in progressive glioblastoma were zero for the three months ended June 30, 2021 and $6.7 million from the projects inception in June 2019 through June 30, 2021. The expenses incurred by us to third parties for our Phase 1/2 clinical trial of Ad-RTS-hIL-12 with veledimex for the treatment of pediatric brain tumors were $0.2 million for the three months ended June 30, 2021 and $2.7 million from the project's inception in October 2017 through June 30, 2021. The expenses incurred by us to third parties for our Phase 1 clinical trial with Ad-RTS-IL-12 plus veledimex in progressive glioblastoma were zero for the three months ended June 30, 2021 and $14.6 million from the project's inception in September 2015 through June 30, 2021. The expenses incurred by us to third parties for our Phase 1 clinical trial infusing our 2nd generation CD19-specific CAR$^+$ T cells in patients with advanced lymphoid malignancies were zero for the three and six months ended June 30, 2021 and $6.2 million from the project's inception in December 2015 through June 30, 2021.

Our future research and development expenses in support of our current and future programs will be subject to numerous uncertainties in timing and cost to completion. We test potential products in numerous preclinical studies for safety, toxicology and efficacy. We may conduct multiple clinical trials for each product. As we obtain results from trials, we may elect to discontinue or

delay clinical trials for certain products to focus our resources on more promising products or indications. Completion of clinical trials may take several years or more, and the length of time generally varies substantially according to the type, complexity, novelty and intended use of a product. It is not unusual for preclinical and clinical development of each of these types of products to require the expenditure of substantial resources.

We estimate that clinical trials of the type generally needed to secure new drug approval are typically completed over the following timelines:

Clinical Phase	Estimated Completion Period
Phase 1	1 - 2 years
Phase 2	2 - 3 years
Phase 3	2 - 4 years

The duration and the cost of clinical trials may vary significantly over the life of a project as a result of differences arising during clinical development, including, among others, the following:

- The number of clinical sites included in the trials;
- The length of time required to enroll suitable patents;
- The number of patients that ultimately participate in the trials;
- The length of time and cost to develop and optimize manufacturing processes;
- The cost to manufacture the clinical products for patients;
- The duration of patient follow-up to ensure the absence of long-term product-related adverse events; and
- The efficacy and safety profile of the product.

As a result of the uncertainties discussed above, we are unable to determine the duration and completion costs of our programs or when and to what extent we will receive cash inflows from the commercialization and sale of a product. Our inability to complete our programs in a timely manner or our failure to enter into appropriate collaborative agreements could significantly increase our capital requirements and could adversely impact our liquidity. These uncertainties could force us to reduce or eliminate our activities in one or more of our programs or seek additional, external sources of financing from time-to-time in order to continue with our product development strategy. Our inability to raise additional capital, or to do so on terms reasonably acceptable to us, would jeopardize the future success of our business.

General and administrative expenses. General and administrative expenses during the three and six months ended June 30, 2021 and 2020 were as follows:

	Three months ended June 30,				Six months ended June 30,			
	2021	2020	Change		2021	2020	Change	
($ in thousands)								
General and administrative	$ 9,069	$ 6,555	$ 2,514	38 %	$ 17,296	$ 12,509	$ 4,787	38 %

General and administrative expenses for the three months ended June 30, 2021 increased by $2.5 million as compared to three months ended June 30, 2020. The increase during the three months ended June 30, 2021 was primarily due to increases related to employee related expenses including noncash stock compensation expense pursuant to our separation agreement with our former Chief Executive Officer.

General and administrative expenses for the six months ended June 30, 2021 increased by $4.8 million as compared to six months ended June 30, 2020. The increase during the six months ended June 30, 2021 was primarily due to an increase of $3.6 million related to employee related expenses, $0.9 million related employee-related separation expenses, and $0.2 million expenses incurred related to consulting service costs.

Other income (expense), net. Other income, net for the three and six months ended June 30, 2021 and 2020 was as follows:

	Three months ended June 30,				Six months ended June 30,			
	2021	2020	Change		2021	2020	Change	
($ in thousands)								
Other income (expense), net	$ (31)	$ 10	$ (41)	(410)%	$ (22)	$ 377	$ (399)	(106)%
Total	$ (31)	$ 10			$ (22)	$ 377		

Other income (expense) for the three and six months ended June 30, 2021 decreased as compared to the three and six months ended June 30, 2020 due to a decrease in our cash balance and a decline in interest rates due to market fluctuations.

Liquidity and Capital Resources

Source of liquidity

We have not generated any revenue from product sales. Since inception, we have incurred net losses and negative cash flows from our operations.

To date, we have financed our operations primarily through public offerings of our common stock, private placements of our convertible equity securities, term debt and collaborations. Through June 30, 2021, we have received an aggregate of $714.1 million from public offerings and through sales under our "at-the market" offering program.

February 2020 Public Offering

On February 5, 2020, we entered into an underwriting agreement with Jefferies LLC, or Jefferies, as representative of the several underwriters named therein, relating to the issuance and sale of 27,826,086 shares of our common stock. The price to the public in the offering was $3.25 per share, and the underwriters agreed to purchase the shares from us pursuant to the underwriting agreement at a purchase price of $3.055 per share.

The offering was made pursuant to our effective registration statement on Form S-3ASR (File No. 333-232283) previously filed with the SEC, and a prospectus supplement thereunder. The net proceeds from the offering were approximately $84.8 million after deducting underwriting discounts and offering expenses paid by us.

On March 10, 2020, the underwriters exercised their option to purchase an additional 1,284,025 shares. The net proceeds were approximately $3.9 million after deducting underwriting discounts and offering expenses paid by the us.

At-the-Market Facility

In June 2019, we entered into an Open Market Sale Agreement, or Sales Agreement, with Jefferies LLC, or Jefferies, as a sale agent pursuant to which we may offer and sell, from time to time through Jefferies, shares of our common stock having an aggregate offering value of up to $100.0 million. Shares will be sold pursuant to our effective registration statement on Form S-3ASR (File No. 333-232283), as previously filed with the Securities and Exchange Commission. Subject to the terms of the sales agreement, we are able to determine, at our sole discretion, the timing and number of shares to be sold under this ATM facility. The compensation to Jefferies for sales of our common stock pursuant to the sales agreement will be an amount equal to 3% of the gross proceeds of any shares of common stock sold under the sales agreement. During the six months ended June 30, 2020, we issued and sold an aggregate of 2,814,673 shares of its common stock. The offering was made pursuant to our effective registration statement on Form S-3ASR (File No. 333-232283) previously filed with the SEC, and a prospectus supplement thereunder. The net proceeds from the offering were approximately $13.0 million after deducting underwriting discounts and offering expenses payable by us. We did not sell any shares of its common stock under the at-the-market facility during the three months ended June 30, 2021.

Term Loan

On August 6, 2021, the Company entered into a credit and security agreement with a lender (the "Term Loan Agreement"). The Term Loan Agreement provides for an initial term loan of $25.0 million funded at the closing, with an additional tranche of $25.0 million available if certain funding and clinical milestones are met by August 31, 2022. Interest on the term loan is payable monthly in arrears at an annual interest rate of the greater of 7.75% or the prime rate plus a margin of 4.5%. The term loan amortization date is April 1, 2022; provided, however, if the Company raises $50M in funding on or prior to March 31, 2022, the term loan first payment date shall automatically be extended to September 1, 2022. Further, if the Company raised $50M on or prior to March 31, 2022 and an additional $50M on or prior to August 31, 2022, the term loan amortization shall automatically be extended to September 1, 2023. The

term loan maturity date is March 1, 2023; provided, however, if Company achieves the funding milestones, the term loan maturity date shall automatically be extended to August 1, 2025. There is a final payment due of 5.75%. The Company granted a warrant at the closing to purchase 432,843 shares at $2.22 per share. The Company will grant a similar warrant if it draws the second $25.0 million tranche.

Funding Requirements

Given our current development plans, we expect that our existing cash and cash equivalents, plus the $25.0 million gross debt proceeds raised in August 2021, will be sufficient to fund our current operations into the fourth quarter of 2022. We currently do not have any committed sources of additional capital at this time. The forecast of cash resources is forward-looking information that involves risks and uncertainties, and the actual amount of our expenses could vary materially and adversely as a result of a number of factors. We have based our estimates on assumptions that may prove to be wrong, and our expenses could prove to be significantly higher than we currently anticipate. Management does not know whether additional financing will be on terms favorable or acceptable to us when needed, if at all. In addition, we have issued or reserved for future issuance shares nearing the maximum number of shares of common stock authorized by our certificate of incorporation. If we are unable to increase the total number of authorized shares, we may be unable to effectively utilize our common stock to raise capital. If adequate additional funds are not available when required, or if we are unsuccessful in entering into partnership agreements for further development of our products, management may need to curtail development efforts. The COVID-19 pandemic continues to rapidly evolve and has already resulted in a significant disruption of global financial markets. If the disruption persists and deepens, we could experience an inability to access additional capital when and if needed. If we are unable to obtain funding, we could be forced to delay, reduce or eliminate some or all of our research and development programs, product portfolio expansion or commercialization efforts, which would adversely affect our business prospects, or we may be unable to continue operations.

In addition to these factors, our actual cash requirements may vary materially from our current expectations due to a number of other factors that may include, but are not limited to, changes in the focus and direction of our development programs, competitive and technical advances, costs associated with the development of our product candidates, our ability to secure partnering arrangements, and the costs of filing, prosecuting, defending and enforcing our intellectual property rights. If we exhaust our capital reserves more quickly than anticipated, regardless of the reason, and we are unable to obtain additional financing on terms acceptable to us or at all, we will be unable to proceed with development of some or all of our product candidates on expected timelines and will be forced to prioritize among them.

Cash flows

The following table summarizes our net decrease in cash, cash equivalents, and restricted cash for the three months ended June 30, 2021 and 2020:

	Six months ended June 30,		
	2021	2020	Change
($ in thousands)			
Net cash provided by (used in):			
Operating activities	$ (36,765)	$ (23,912)	$ (12,853)
Investing activities	(2,594)	(4,000)	1,406
Financing activities	1,036	101,692	(100,656)
Net increase in cash, cash equivalents, and restricted cash	$ (38,323)	$ 73,780	$ (112,103)

Cash flows from operating activities represent the cash receipts and disbursements related to all of our activities other than investing and financing activities. Operating cash flow is derived by adjusting our net loss for:

- Non-cash operating items such as depreciation and stock-based compensation; and
- Changes in operating assets and liabilities, which reflect timing differences between the receipt and payment of cash associated with transactions and when they are recognized in results of operations.

Net cash used in operating activities for the six months ended June 30, 2021 was $36.8 million, as compared to net cash used in operating activities of $23.9 million for the six months ended June 30, 2020. The net cash used in operating activities for the six months ended June 30, 2021 was primarily due to our net loss of $44.2 million, the decrease in prepaid and other current assets of $5.8 million offset by an increase in receivables of $3.0 million related to the use of our funds at MD Anderson, the change in accrued expenses of $4.8 million, the change in non-cash stock-based compensation of $7.5 million, and increase in lease liabilities of $0.8 million.

Net cash used in investing activities was $2.6 million for the six months ended June 30, 2021 compared to $4.0 million for the six months ended June 30, 2020.

Net cash provided by financing activities the six months ended June 30, 2021 was $1.0 million related to proceeds from the exercise of stock options. Net cash provided by financing activities the six months ended June 30, 2020 was $101.7 million, which included $88.7 million from the issuance of common stock in our public offering, net and $13.0 million from the issuance of common stock in our at the market offerings, net.

Operating capital and capital expenditure requirements

We anticipate that losses will continue for the foreseeable future. At June 30, 2021, our accumulated deficit was approximately $808.3 million. Our actual cash requirements will depend on and could increase significantly as a result of a number of factors, including:

- the scope, number, initiation, progress, timing, costs, design, duration, any potential delays, and results of clinical trials and nonclinical studies for our current or future product candidates;
- changes in the focus, direction and pace of our development programs;
- the effect of competitive and technical advances and market developments;
- costs associated with the development of our product candidates;
- our ability to establish and maintain partnering, collaborations or similar arrangements on favorable terms and whether and to what extent we retain development or commercialization responsibilities under any new licensing, collaboration or similar arrangement;
- diversion of healthcare resources away from the conduct of clinical trials as a result of the ongoing COVID-19 pandemic, including the diversion of hospitals serving as our clinical trial sites and hospital staff supporting the conduct of our clinical trials;
- the interruption of key clinical trial activities, such as clinical trial site monitoring, due to limitations on travel, quarantines or social distancing protocols imposed or recommended by federal or state governments, employers and others in connection with the ongoing COVID-19 pandemic;
- our need and ability to hire additional management and scientific and medical personnel;
- the costs of acquiring, licensing or investing in businesses, product candidates and technologies;
- costs of filing, prosecuting, defending and enforcing any patent claims and any other intellectual property rights, or other developments; and
- other matters identified under Part II, Item 1A. “Risk Factors.”

Our working capital as of June 30, 2021 was $75.8 million, consisting of $89.4 million in current assets and $13.6 million in current liabilities. Working capital as of December 31, 2020 was $112.2 million, consisting of $130.6 million in current assets and $18.4 million in current liabilities. In May 2021, as a result of our review of our research and development portfolio, we announced the realigning of resources behind our Sleeping Beauty program. Resources currently deployed towards our Controlled IL-12 clinical program are currently being reduced, and we anticipate the realignment of resources will reduce cash expenditures on the Controlled IL-12 program.

Contractual Obligations

The following table summarizes our outstanding obligations as of June 30, 2021 and the effect those obligations are expected to have on our liquidity and cash flows in future periods:

($ in thousands)	Total	Less than 1 year	2 -3 years	4 -5 years	More than 5 years
Operating leases	$ 7,091	$ 1,165	$ 2,263	$ 2,402	$ 1,261
Royalty and license fees	3,027	350	700	450	1,527
Strategic advisory fees	1,375	1,375	-	-	-
Total	$ 11,493	$ 2,890	$ 2,963	$ 2,852	$ 2,788

Our commitments for operating leases relate to the lease for our corporate headquarters in Boston, Massachusetts, and laboratory and office space in Houston, Texas. On December 21, 2015 and April 15, 2016, we renewed the lease for our corporate headquarters in

Boston, MA through August 31, 2021. On April 22, 2021, we extended our lease for a portion of office space currently held at our corporate office headquarters in Boston. The renewal of the portion of our corporate office headquarters was originally set to expire on August 31, 2021, but has now been extended through August 31, 2026.

On January 30, 2018, we entered into a lease agreement for office space in Houston, TX at MD Anderson through April 2021. On March 12, 2019, we entered into a lease agreement for additional office space in Houston through April 2021. On October 15, 2019, we entered into another lease agreement for additional office and lab space in Houston through February 2027. On April 13, 2020, we entered into another lease agreement for additional office and laboratory space in Houston through February 2027. On June 1, 2020, we entered into a short-term lease in Houston for office and laboratory space. On September 1, 2020, we entered an additional short-term lease in Houston for additional office and laboratory space. On December 15, 2020, we entered into another lease for additional office and laboratory space in Houston through April 2028.

On January 10, 2017, we announced the signing of a Cooperative Research and Development Agreement, or CRADA with the NCI for the development of ACT-based immunotherapies genetically modified using the Sleeping Beauty transposon/transposase system for the treatment of solid tumors. In February 2019, we extended the CRADA with the NCI until January 9, 2022.

On May 28, 2019, we entered into a patent license agreement, or the Patent License, with the NCI. The terms of the Patent License require us to pay the NCI minimum annual royalties in the amount of $0.3 million, which amount will be reduced to $0.1 million once the aggregate minimum annual royalties paid by us equals $1.5 million.

On October 5, 2018, we entered into the License Agreement with PGEN Therapeutics, Inc. or PGEN, a wholly owned subsidiary of Precigen Inc., or Precigen, which was formerly known as Intrexon Corporation. Under the License Agreement, we are obligated to pay PGEN an annual licensing fee of $0.1 million expected to be paid through the term of the agreement.

On November 27, 2020, we entered into two agreements for strategic advisory services that require us to pay $1.5 million through the end of the service period, concluding in September 2021.

Off-balance Sheet Arrangements

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

Critical Accounting Policies and Estimates

In our Annual Report, our most critical accounting policies and estimates upon which our financial status depends were identified as those relating to clinical trial expenses; collaboration agreements; fair value measurements for stock-based compensation; and income taxes. We reviewed our policies and determined that those policies remain our most critical accounting policies for the six months ended June 30, 2021.

Item 3. Quantitative and Qualitative Disclosures about Market Risk

Our exposure to market risk is limited to our cash. The goals of our investment policy are preservation of capital, fulfillment of liquidity needs and fiduciary control of cash. We also seek to maximize income from our investments without assuming significant risk. To achieve our goals, we maintain our cash in interest-bearing bank accounts in global banks, United States treasuries and other government-backed investments, which are subject to minimal interest rate risk.

Effect of Currency Exchange Rates and Exchange Rate Risk Management

We currently have no clinical studies or clinical trials taking place outside of the United States. Therefore, any currency fluctuations will not have a material impact on our financial position, results of operations or cash flows.

Item 4. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our principal executive officer and principal financial officer, has evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) or 15d-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act) as of June 30, 2021. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by the company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Securities and Exchange Commission’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required

to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. Our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and our management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of June 30, 2021, our principal executive officer and principal financial officer concluded that, as of such date, our disclosure controls and procedures were not effective at the reasonable assurance level.

Material Weakness

At June 30, 2021, we identified a material weakness in our internal controls over financial reporting relating to the reconciliation and review of our accounts in a timely manner. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's interim or annual financial statements will not be prevented or detected on a timely basis. Specifically, our identified material weakness existing in our financial reporting process relates to the lack of sufficient accounting resources to execute certain controls related to the reconciliation and review of accounts in a timely manner. The material weakness had no impact on any amounts reported in the financial statements for the quarter ended June 30, 2021 or for any previous period.

Remediation Efforts to Address Material Weakness

We currently are preparing a remediation plan to address the underlying cause of the material weakness described above. We expect that the remediation plan will include, among other things, reassessing the design and operation of the internal controls over our financial statement close process and the related accounting staffing levels and experience and designing and implementing effective internal controls related to reconciliation and review of our accounts. The material weakness had no impact on any amounts reported in the financial statement for the quarter ended June 30, 2021 or for any previous period. Management is committed to remediating the material weakness in a timely manner.

Changes in Internal Control over Financial Reporting

We are taking actions to remediate the material weakness related to our internal control over financial reporting, as described above. However, our remediation efforts were not complete as of June 30, 2021. Other than the changes disclosed above, there were no material changes in our internal control over financial reporting identified in connection with the evaluation required by Rules 13a-5 and 15d-15 under the Exchange Act that occurred during the quarter ended June 30, 2021 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Part II - Other Information

Item 1. Legal Proceedings

In the ordinary course of business, we may periodically become subject to legal proceedings and claims arising in connection with ongoing business activities from time to time. The results of litigation and claims cannot be predicted with certainty, and unfavorable resolutions are possible and could materially affect our results of operations, cash flows or financial position. In addition, regardless of the outcome, litigation could have an adverse impact on us because of defense costs, diversion of management attention and resources and other factors.

As of June 30, 2021, based on information readily available, there are no material matters that, in the opinion of management, are likely to result in a material adverse effect on our financial position, results of operations or cash flows.

Item 1A. Risk Factors

The following important factors could cause our actual business and financial results to differ materially from those contained in forward-looking statements made in this Quarterly Report on Form 10-Q or elsewhere by management from time to time. The risk factors in this Quarterly Report have been revised to incorporate changes to our risk factors from those included in our Annual Report on Form 10-K for the fiscal year ended December 31, 2020. The risk factors set forth below with an asterisk (*) next to the title are new risk factors or risk factors containing changes, which may be material, from the risk factors previously disclosed in Item 1A of our Annual Report on Form 10-K for the fiscal year ended December 31, 2020, as filed with the Securities and Exchange Commission. The market price of our common stock could decline if one or more of these risks or uncertainties actually occur, causing you to lose all or part of your investment. The impact of COVID-19 may also exacerbate other risks discussed in this filing, any of which could have a material effect on us. This situation is changing rapidly and additional impacts may arise. Additional risks that we currently do not know about, or that we currently believe to be immaterial, may also impair our business. Certain statements below are forward-looking statements. See “Cautionary Note Regarding Forward-Looking Statements” in this Quarterly Report.

RISKS RELATED TO OUR BUSINESS

Our business, operations and clinical development plans and timelines could be adversely affected by the effects of health epidemics, including the COVID-19 pandemic, on the manufacturing, clinical trial and other business activities performed by us or by third parties with whom we conduct business, including our contract manufacturers, clinical research organizations, or CROs, shippers and others.

Our business could be adversely affected by health epidemics wherever we have clinical trial sites or other business operations. In addition, health epidemics could cause significant disruption in the operations of third-party manufacturers, CROs and other third parties upon whom we rely.

We have implemented work-from-home policies for non-laboratory functions. The effects of our work-from-home policies and travel restrictions may negatively impact productivity, disrupt our business and delay our clinical programs and timelines, the magnitude of which will depend, in part, on the length and severity of the restrictions and other limitations on our ability to conduct our business in the ordinary course. These and similar, and perhaps more severe, disruptions in our operations could negatively impact our business, operating results and financial condition.

We depend on a worldwide supply chain to manufacture products used in our preclinical studies and clinical trials. Quarantines, shelter-in-place and similar government orders, or the expectation that such orders, shutdowns or other restrictions could occur, whether related to COVID-19 or other infectious diseases, could impact personnel at our own manufacturing facilities or third-party manufacturing facilities in the United States and other countries, or the availability or cost of materials, which could disrupt our supply chain.

If our relationships with our suppliers or other vendors are terminated or scaled back as a result of the COVID-19 pandemic or other health epidemics, we may not be able to enter into arrangements with alternative suppliers or vendors or do so on commercially reasonable terms or in a timely manner. Switching or adding additional suppliers or vendors involves substantial cost and requires management time and focus. In addition, there is a natural transition period when a new supplier or vendor commences work. As a result, delays may occur, which could adversely impact our ability to meet our desired clinical development and any future commercialization timelines. Although we carefully manage our relationships with our suppliers and vendors, there can be no assurance that we will not encounter challenges or delays in the future or that these delays or challenges will not harm our business.

In addition, our preclinical studies and clinical trials have been and may continue to be affected by the COVID-19 pandemic. Clinical site initiation, patient enrollment and activities that require visits to clinical sites, including data monitoring, have been and may continue to be delayed due to prioritization of hospital resources toward the COVID-19 pandemic or concerns among patients about participating in clinical trials during a pandemic. Some patients may have difficulty following certain aspects of clinical trial protocols

if quarantines impede patient movement or interrupt healthcare services. Similarly, if we are unable to successfully recruit and retain patients and principal investigators and site staff who, as healthcare providers, may have heightened exposure to COVID-19 or experience additional restrictions by their institutions, city, or state our clinical trial operations could be adversely impacted.

The spread of COVID-19, which has caused a broad impact globally, may materially affect us economically. While the potential economic impact brought by, and the duration of, COVID-19 may be difficult to assess or predict, a widespread pandemic could result in significant disruption of global financial markets, reducing our ability to access capital, which could in the future negatively affect our liquidity. In addition, a recession or market correction resulting from the spread of COVID-19 could materially affect our business and the value of our common stock.

The global COVID-19 pandemic continues to evolve rapidly. The ultimate impact of the COVID-19 pandemic or a similar epidemic is highly uncertain and subject to change. We may experience a material impact on our operations, and we continue to monitor the COVID-19 situation closely.

We will require substantial additional financial resources to continue ongoing development of our product candidates and pursue our business objectives; if we are unable to obtain these additional resources when needed, we may be forced to delay or discontinue our planned operations, including clinical testing of our product candidates.

We have not generated significant revenue and have incurred significant net losses in each year since our inception. For the six months ended June 30, 2021, we had a net loss of $44.2 million, and, as of June 30, 2021, we have incurred approximately $808.3 million of accumulated deficit since our inception in 2003. We expect to continue to incur significant operating expenditures and net losses. Further development of our product candidates will require substantial increases in our expenses as we:

- continue to undertake clinical trials for product candidates;
- scale-up the formulation and manufacturing of our product candidates;
- seek regulatory approvals for product candidates;
- work with regulatory authorities to identify and address program-related inquiries;
- implement additional internal systems and infrastructure; and
- hire additional personnel, including highly-skilled and experienced scientific and medical staff.

As of June 30, 2021, we have approximately $76.7 million of cash and cash equivalents. Given our current development plans, we anticipate our cash resources, plus the $25.0 million gross debt proceeds raised in August 2021,will be sufficient to fund our operations into the fourth quarter of 2022 and we have no committed sources of additional capital at this time. The forecast of cash resources is forward-looking information that involves risks and uncertainties, and the actual amount of our expenses could vary materially and adversely as a result of a number of factors. We have based our estimates on assumptions that may prove to be wrong, and our expenses could prove to be significantly higher than we currently anticipate. Management does not know whether additional financing will be on terms favorable or acceptable to us when needed, if at all.

Our actual cash requirements may vary materially from our current expectations for a number of other factors that may include, but are not limited to, changes in the focus and direction of our development programs, slower and/or faster than expected progress of our research and development efforts, changes in governmental regulation, competitive and technical advances, rising costs associated with the development of our product candidates, our ability to secure partnering arrangements, and costs of filing, prosecuting, defending and enforcing our intellectual property rights. The COVID-19 pandemic continues to rapidly evolve and has already resulted in a significant disruption of global financial markets. If the disruption persists and deepens, we could experience an inability to access additional capital, which could in the future negatively affect our operations. If we exhaust our capital reserves more quickly than anticipated, regardless of the reason, and we are unable to obtain additional financing on terms acceptable to us or at all, we will be unable to proceed with development of some or all of our product candidates on expected timelines and will be forced to prioritize among them.

Further, we may elect to prioritize one or more of our programs and reduce or eliminate our activities on our other programs to preserve our capital resources. Any decision to reduce or eliminate activities for a program may negatively impact the potential for the program, which could have a material adverse effect on our business. For instance, we have decided to wind down the existing clinical programs of our Controlled IL-12 program in 2021 and to actively explore partnership opportunities for the Controlled IL-12 program to support its continued development. Some of these changes to our planned Controlled IL-12 program may impact the prospects and future development of this program, including our ability to pursue later stage development or a partnership for this program.

We need to raise additional capital to fund our operations. The manner in which we raise any additional funds may affect the value of your investment in our common stock.

Until such time, if ever, as we can generate substantial revenue, we expect to finance our cash needs through a combination of equity offerings, debt financings and license and collaboration agreements. We do not have any committed external source of funds. The unpredictability of the capital markets may severely hinder our ability to raise capital within the time periods needed or on terms we consider acceptable, if at all. In addition, the ongoing COVID-19 pandemic continues to disrupt the global financial markets, negatively impacted U.S. market conditions and may reduce opportunities for us to seek out additional funding in the future. In particular, a decline in the market price of our common stock could make it more difficult for us to sell equity or equity-related securities in the future at a time and price that we deem appropriate. Moreover, if we fail to advance one or more of our current product candidates into early or later-stage clinical trials, successfully commercialize one or more of our product candidates, or acquire new product candidates for development, we may have difficulty attracting investors that might otherwise be a source of additional financing.

In June 2019, we entered into an Open Market Sale Agreement with Jefferies LLC, as agent, or Jefferies, pursuant to which we may offer and sell, from time to time through Jefferies, shares of our common stock having an aggregate offering price of up to $100.0 million. Shares will be sold pursuant to our effective registration statement on Form S-3ASR (File No. 333-232283), as previously filed with the Securities and Exchange Commission. During the year ended December 31, 2020, we issued and sold an aggregate of 2,814,673 shares of our common stock under the sales agreement for aggregate net proceeds of $13.0 million after deducting commissions and offering expenses of $0.4 million and may sell and issue approximately $80.9 million in additional shares under the sales agreement. There were no issuances during the three or six months ended June 30, 2021.

To the extent that we raise additional capital by issuing equity securities such as under our at-the-market program, our existing stockholders' ownership 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 and preferred equity 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. Any debt financing that we enter into may involve covenants that restrict our operations. These restrictive covenants may include limitations on additional borrowing and specific restrictions on the use of our assets as well as prohibitions on our ability to create liens, pay dividends, redeem our stock or make investments. Furthermore, the ongoing impact of COVID-19 on global financial markets could make the terms of any available financing less attractive to use and more dilutive to our existing shareholders. If we are unable to raise additional funds through equity or debt financings when needed, we may be required to delay, limit, reduce or terminate our product development or future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves. If we raise additional funds through collaborations, strategic alliances or marketing, distribution 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 grant licenses on terms that may not be favorable to us.

We have identified a material weakness in our internal control as of June 30, 2021 and may identify additional material weaknesses in the future or otherwise fail to maintain an effective system of internal controls, which may result in material misstatements of our financial statements or could have a material adverse effect on our business and trading price of our securities.

We are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, the Sarbanes-Oxley Act of 2002 and the rules and regulations of the Nasdaq Global Market. Pursuant to Section 404 of the Sarbanes-Oxley Act of 2002, we are required to perform system and process evaluation and testing of our internal control over financial reporting to allow our management to report on the effectiveness of our internal control over financial reporting. We are also required to have our independent registered public accounting firm issue an opinion on the effectiveness of our internal control over financial reporting on an annual basis.

In connection with the review of our consolidated financial statements as of and for the quarter ended June 30, 2021, we identified a material weakness in our internal control over financial reporting. A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of our consolidated financial statements will not be prevented or detected on a timely basis. The material weakness was related to the reconciliation and review of our accounts in a timely manner. Specifically, our identified material weakness existing in our financial reporting process relates to the lack of sufficient accounting resources to execute certain controls related to the reconciliation and review of accounts in a timely manner.

We are in the process of designing and implementing measures to remediate the underlying causes of the control deficiencies that gave rise to the material weakness. We will continue to monitor the effectiveness of these controls and will make any further changes management determines appropriate.

We cannot assure you that any measures we are taking or may take in the future will be sufficient to remediate the control deficiencies that led to the material weakness in our internal control over financial reporting or to avoid potential future material weaknesses. We also previously had a material weakness identified for the year ended December 31, 2019, which was fully remediated as of December 31, 2020. If we are unable to successfully remediate our existing or any future material weakness in our internal control over financial reporting, or if we identify any additional material weaknesses, the accuracy and timing of our financial reporting may be adversely affected. If we are unable to maintain effective internal controls, we may not have adequate, accurate or timely financial information, and we may be unable to meet our reporting obligations as a public company, including the requirements of the Sarbanes-Oxley Act, we may be unable to accurately report our financial results in future periods, or report them within the timeframes required by the requirements of the SEC, Nasdaq or the Sarbanes-Oxley Act. Failure to comply with the Sarbanes-Oxley Act, when and as applicable, could also potentially subject us to sanctions or investigations by the SEC or other regulatory authorities. Any failure to maintain or implement required new or improved controls, or any difficulties we encounter in their implementation, could result in identification of additional material weaknesses or significant deficiencies, cause us to fail to meet our reporting obligations or result in material misstatements in our financial statements. 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.

Our plans to develop and commercialize non-viral adoptive cellular therapies such as TCR therapies and CAR T-cell can be considered as new approaches to cancer treatment, the successful development of which is subject to significant challenges.

We intend to employ technologies such as the technology licensed from MD Anderson pursuant to the MD Anderson License described above, and from PGEN, pursuant to the License Agreement, to pursue the development and commercialization of non-viral and viral adoptive cellular therapies based on cytokines, T-cells, CARs and TCRs, possibly under control of the RTS® and other switch technologies targeting both hematologic and solid tumor malignancies. Because this is a new approach to cancer immunotherapy and cancer treatment generally, developing and commercializing product candidates subjects us to a number of challenges, including:

- obtaining regulatory approval from the FDA and other regulatory authorities that have very limited experience with the commercial development of genetically modified and/or unmodified T-cell therapies for cancer;
- identifying and manufacturing appropriate TCRs from patient and from third parties that can be administered to a patient;
- developing and deploying consistent and reliable processes for engineering a patient's and/or donor's T-cells *ex vivo* and infusing the T-cells back into the patient;
- possibly conditioning patients with chemotherapy in conjunction with delivering each of the potential products, which may increase the risk of adverse side effects of the potential products;
- educating medical personnel regarding the potential side effect profile of each of the potential products, such as the potential adverse side effects related to cytokine release;
- addressing any competing technological and market developments;
- developing processes for the safe administration of these potential products, including long-term follow-up for all patients who receive the potential products;
- sourcing additional clinical and, if approved, commercial supplies for the materials used to manufacture and process the potential products;
- developing a manufacturing process and distribution network with a cost of goods that allows for an attractive return on investment;
- establishing sales and marketing capabilities after obtaining any regulatory approval to gain market acceptance;
- developing therapies for types of cancers beyond those addressed by the current potential products;
- maintaining and defending the intellectual property rights relating to any products we develop;
- and not infringing the intellectual property rights, in particular, the patent rights, of third parties, including competitors, such as those developing T-cell therapies.

We cannot assure you that we will be able to successfully address these challenges, which could prevent us from achieving our research, development and commercialization goals.

Our current product candidates are based on novel technologies and are supported by limited clinical data and we cannot assure you that our current and planned clinical trials will produce data that supports regulatory approval of one or more of these product candidates.

The immuno-oncology effector platform in which we have acquired rights pursuant to our License Agreement with PGEN represents early-stage technology in the field of human oncology biotherapeutics, with Ad-RTS-IL-12 plus veledimex having completed trials, in melanoma, breast cancer and rGBM. Similarly, our genetically modified and/ or non-modified T-cell candidates are supported by limited clinical data, all of which has been generated through trials conducted by MD Anderson, the NCI, and Eden BioCell, not by us. We plan to assume control of the overall clinical and regulatory development of our T-cell product candidates, and any failure to obtain, or delays in obtaining, sponsorship of new INDs, or in filing INDs sponsored by us for these or any other product candidates we determine to advance could negatively affect the timing of our potential future clinical trials. Such an impact on timing could increase research and development costs and could delay or prevent obtaining regulatory approval for our product candidates, either of which could have a material adverse effect on our business.

Further, we did not control the design or conduct of the previous trials. It is possible that the FDA will not accept these previous trials as providing adequate support for future clinical trials, whether controlled by us or third parties, for any of one or more reasons, including the safety, purity, and potency of the product candidate, the degree of product characterization, elements of the design or execution of the previous trials or safety concerns, or other trial results. We may also be subject to liabilities arising from any treatment-related injuries or adverse effects in patients enrolled in these previous trials. As a result, we may be subject to unforeseen third-party claims and delays in our potential future clinical trials. We may also be required to repeat in whole or in part clinical trials previously conducted by MD Anderson or other entities, which will be expensive and delay the submission and licensure or other regulatory approvals with respect to any of our product candidates.

In addition, the results of the limited clinical trials conducted to date may not be replicated in future clinical trials. Our Ad-RTS-IL-12 plus veledimex and genetically modified and non-modified T-cell product candidates, as well as other product candidates, may fail to show the desired safety and efficacy in clinical development, and we cannot assure you that the results of any future trials will demonstrate the value and efficacy of our product candidates. Moreover, there are a number of regulatory requirements that we must satisfy before we can continue clinical trials of CAR+ T, TCRs or other cellular therapy product candidates in the United States. Satisfaction of these requirements will entail substantial time, effort and financial resources. Any time, effort and financial resources we expend on our Ad-RTS-IL-12 plus veledimex and genetically modified and non-modified T-cell product candidates and other early-stage product candidate development programs may adversely affect our ability to continue development and commercialization of our immuno-oncology product candidates.

We report interim data on certain of our clinical trials and we cannot assure you that interim data will be predictive of either future interim results or final study results.

As part of our business, we provide updates related to the development of our product candidates, which may include updates related to interim clinical trial data. To date, our clinical trials have involved small patient populations and because of the small sample size, the interim results of these clinical trials may be subject to substantial variability and may not be indicative of either future interim results or final results.

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

The development and commercialization for new products to treat cancer, including the indications we are pursuing, is highly competitive and considerable competition exists from major pharmaceutical, biotechnology and specialty cancer companies. Many of these companies have more experience in preclinical and clinical development, manufacturing, regulatory, and global commercialization. We are also competing with academic institutions, governmental agencies, and private organizations that are conducting research in the field of cancer.

Our genetically engineering T-cell programs face significant competition in the CAR and TCR technology space from multiple companies and their collaborators. Three such companies, Novartis International AG (Kymriah®), Kite Pharma Inc./Gilead Sciences, Inc. (Yescarta®) and Bristol-Myers Squibb Company (Breyanzi®), have now commercialized autologous CAR+ T cells against CD19. Additional companies developing autologous CAR+ T targets include Bristol-Myers Squibb Company, Precigen, Inc., bluebird bio, Inc., in collaboration with Celgene Corporation, Nanjing Legend Biotech and Janssen Biotech, Inc., a subsidiary of Johnson & Johnson, Gracell Biotechnologies Inc., CARsgen Therapeutics Co. Ltd., Bellicum Pharmaceuticals, Inc., Autolus Therapeutics plc, Exuma Biotech Corp., Mustang Bio, Inc., Crispr Therapeutics AG, Protheragen Inc. and Marker Therapeutics, Inc. Several companies are pursuing the development of allogeneic CAR+ T therapies, including Allogene Therapeutics, Inc., Atara Biotherapeutics, Inc., Precision Biosciences Inc.,and Servier (in collaboration with Cellectis) which may compete with our product candidates.

Our TCR program faces competition from several companies, including from Adaptimmune Therapeutics plc in collaboration with GlaxoSmithKline plc, ArsenalBio, Lyell, bluebird bio, BioNTech AG, Kite Pharma Inc./Gilead Sciences, Inc., Achilles Therapeutics Limited, Iovance Biotherapeutics, Inc., Immatics Biotechnologies GmbH, Tmunity Therapeutics Inc., Medigene AG, Tactiva Therapeutics, LLC, Takara Bio, Inc., TCR2 Therapeutics Inc., Zelluna Immunotherapy AS, PACT Pharma, Inc. and others. Many of these companies are either investigating TCR T cells against germline antigens or are utilizing tumor infiltrating lymphocytes (TIL) whereas Ziopharm is focused on developing TCR T cell products against neoantigens arising from somatic mutations in solid tumors. Several companies, including Advaxis Inc./Amgen Inc., BioNTech AG and Gritstone Oncology, Inc., are pursuing vaccine platforms to target neoantigens for solid tumors. Other companies are developing non-viral gene therapies, including Poseida Therapeutics, Inc. and several companies developing CRISPR technology. We also face competition from companies developing therapies using cells other than T cells such as Takeda Pharmaceutical Company, ImmunityBio, IN8bio, Inc., Fate Therapeutics Inc., and TC BioPharm Limited. We also face competition from companies developing T cells with cytokines such as Repertoire Immune Medicines and Obsidian Therapeutics, Inc. We also face competition from non-cell- based treatments offered by other companies such as Amgen Inc., AstraZeneca plc, Bristol-Myers Squibb Company, Incyte Corporation, Merck & Co., Inc., and Roche Holding AG.

We initially developed our Controlled IL-12 platform for the treatment of rGBM. Companies that sell marketed drugs for rGBM are Genentech Inc. and Roche Holding AG with Avastin (bevacizumab), a vascular endothelial growth factor directed antibody indicated for the treatment of adults with rGBM. Arbor Pharmaceuticals Inc. markets GLIADEL Wafer, which is indicated in patients with newly diagnosed high-grade malignant glioma as an adjunct to surgery and radiation and is also indicated in patients with recurrent glioblastoma multiforme as an adjunct to surgery. Additionally, Novocure has developed Optune (tumor treating fields) for newly diagnosed and recurrent glioblastoma. Several companies have product candidates in Phase 3 development for the treatment of glioblastoma, including, but not limited to, Cordgenics, LLC, Bayer AG, Kazia Therapeutics Limited, and Kintara Therapeutics, Inc. Several companies and institutions have product candidates currently in Phase 2 clinical trials, including, but not limited to, Abbvie Inc., DNAtrix Therapeutics, Istari Oncology, Karyopharm and MedImmune LLC/AstraZeneca plc, and other companies are actively developing additional products to treat brain cancer including Mustang Bio Inc. and Northwest Biotherapeutics, Inc. Other competitors with product candidates currently in Phase 2 clinical trials include AbbVie Inc.'s Depatus-M (ABT-414) and DNA-2401, a conditionally replicative adenovirus being evaluated in combination with pembrolizumab Phase 2 study of oncolytic polio/rhinovirus recombinant (PVSRIPO) alone or in combination with lomustine in recurrent WHO Grade IV malignant glioma patients. Also, MedImmune, LLC/AstraZeneca plc's durvalumab was evaluated in a Phase 2 trial in patients with rGBM.

Even if we obtain regulatory approval of potential products, we may not be the first to market and that may affect the price or demand for our potential products. Existing or future competing products may provide greater therapeutic convenience or clinical or other benefits for a specific indication than our products or may offer comparable performance at a lower cost. Additionally, the availability and price of our competitors' products could limit the demand and the price we are able to charge for our potential products. We may not be able to implement our business plan if the acceptance of our potential products is inhibited by price competition or the reluctance of physicians to switch from existing methods of treatment to our potential products, or if physicians switch to other new drug or biologic products or choose to reserve our potential products. Additionally, a competitor could obtain orphan product exclusivity from the FDA with respect to such competitor's product. If such competitor product is determined to be the same product as one of our potential products, that may prevent us from obtaining approval from the FDA for such potential products for the same indication for seven years, except in limited circumstances. If our products fail to capture and maintain market share, we may not achieve sufficient product revenues and our business will suffer.

We compete against fully integrated pharmaceutical companies and smaller companies that are collaborating with larger pharmaceutical companies, academic institutions, government agencies and other public and private research organizations. Many of these competitors have products already approved or in development. In addition, many of these competitors, either alone or together with their collaborative partners, operate larger research and development programs or have substantially greater financial resources than we do, as well as significantly greater experience in:

- developing drugs and biopharmaceuticals;
- undertaking preclinical testing and human clinical trials;
- obtaining FDA and other regulatory approvals of drugs and biopharmaceuticals;
- formulating and manufacturing drugs and biopharmaceuticals; and
- launching, marketing, and selling drugs and biopharmaceuticals.

Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are more effective, have fewer or less severe side effects, are more convenient or are less expensive than any products that we may develop. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market. In addition,

our ability to compete may be affected in many cases by insurers or other third-party payors seeking to encourage the use of generic products.

Any termination of our licenses with PGEN, MD Anderson or the National Cancer Institute or our research and development agreements with MD Anderson could result in the loss of significant rights and could harm our ability to develop and commercialize our product candidates.

We are dependent on patents, know-how, and proprietary technology that are licensed from others, particularly MD Anderson, Precigen and the National Cancer Institute, or the NCI, as well as the contributions by MD Anderson under our research and development agreements. Any termination of these licenses or research and development agreements could result in the loss of significant rights and could harm our ability to commercialize our product candidates. Disputes may also arise between us and these licensors regarding intellectual property subject to a license agreement, including those relating to:

- the scope of rights granted under the applicable license agreement and other interpretation-related issues;
- whether and the extent to which our technology and processes, and the technology and processes of PGEN, MD Anderson, the NCI and our other licensors, infringe intellectual property of the licensor that is not subject to the applicable license agreement;
- our right to sublicense patent and other rights to third parties pursuant to our relationships with our licensors and partners;
- whether we are complying with our diligence obligations with respect to the use of the licensed technology in relation to our development and commercialization of our potential products under the MD Anderson License, the License Agreement with PGEN and our patent license agreement with the NCI;
- whether or not our partners are complying with all of their obligations to support our programs under licenses and research and development agreements; and
- the allocation of ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and by us.

If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements, particularly with MD Anderson, PGEN and the NCI, on acceptable terms, we may be unable to successfully develop and commercialize the affected potential products. We are generally also subject to all of the same risks with respect to protection of intellectual property that we license as we are for intellectual property that we own. If we or our licensors fail to adequately protect this intellectual property, our ability to commercialize potential products under our applicable licenses could suffer. There is a substantial amount of litigation involving patents and other intellectual property rights in the biotechnology and pharmaceutical industries, as well as administrative proceedings for challenging patents, including interference, derivation, and reexamination proceedings before the United States Patent and Trademark Office, or USPTO, or oppositions and other comparable proceedings in foreign jurisdictions. Recently, due to changes in U.S. law referred to as patent reform, new procedures including inter partes review and post-grant review have been implemented, which adds uncertainty to the possibility of challenge to our or our licensors' patents in the future.

We may not be able to retain the rights licensed to us and PGEN by MD Anderson to technologies relating to CAR, T-cell therapies and other related technologies.

Under the MD Anderson License, we, together with PGEN, received an exclusive, worldwide license to certain technologies owned and licensed by MD Anderson including technologies relating to novel CAR+ T cell and TCR cell therapies arising from the laboratory of Laurence Cooper, M.D., Ph.D., who was then at MD Anderson, as well as either co-exclusive or non-exclusive licenses under certain related technologies. When combined with PGEN's technology suite and Ziopharm's clinically tested RTS® interleukin 12 modules, the resulting proprietary methods and technologies may help realize the promise of genetically modified CAR+ T cells and TCR therapies by controlling cell expansion and activation in the body, minimizing off-target and unwanted on-target effects and toxicity while maximizing therapeutic efficacy. The term of the MD Anderson License expires on the last to occur of (a) the expiration of all patents licensed thereunder, or (b) the twentieth anniversary of the date of the MD Anderson License; provided, however, that following the expiration of the term, we and PGEN shall then have a fully-paid up, royalty free, perpetual, irrevocable and sublicensable license to use the licensed intellectual property thereunder.

After 10 years from the date of the MD Anderson License and subject to a 90-day cure period, MD Anderson will have the right to convert the MD Anderson License into a non-exclusive license if we and PGEN are not using commercially reasonable efforts to commercialize the licensed intellectual property on a case-by-case basis. After five years from the date of the MD Anderson License and subject to a 180-day cure period, MD Anderson will have the right to terminate the MD Anderson License with respect to specific technology(ies) funded by the government or subject to a third-party contract if we and PGEN are not meeting the diligence

requirements in such funding agreement or contract, as applicable. MD Anderson may also terminate the agreement with written notice upon material breach by us or PGEN, if such breach has not been cured within 60 days of receiving such notice. In addition, the MD Anderson License will terminate upon the occurrence of certain insolvency events for both us or PGEN and may be terminated by the mutual written agreement of us, PGEN and MD Anderson.

There can be no assurance that we will be able to successfully perform under the MD Anderson License and if the MD Anderson License is terminated it may prevent us from achieving our business objectives.

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

Human clinical trials are very expensive and difficult to design, initiate and implement, in part because they are subject to rigorous regulatory requirements. The clinical trial start-up and process itself is also time-consuming and results are inherently uncertain. We estimate that clinical trials of our product candidates will take at least several years to complete. Furthermore, failure can occur at any stage of the trials, and we could encounter problems that cause us to delay the start of, abandon or repeat clinical trials. The commencement and completion of clinical trials may be delayed by several factors, including:

- Additional nonclinical data requests by regulatory agencies;
- Unforeseen safety issues;
- Determination of dosing issues;
- Lack of effectiveness during clinical trials;
- Slower than expected rates of patient recruitment and enrollment;
- Inability to monitor patients adequately during or after treatment;
- Inability or unwillingness of medical investigators to follow our clinical protocols; and
- Regulatory determinations to temporarily or permanently cease enrollment for other reasons not related to patient safety.

Success in preclinical testing and early clinical trials does not ensure that later clinical trials will be successful. In addition, we or the FDA may suspend our clinical trials at any time if it appears that we are exposing participants to unacceptable health risks or if the FDA finds deficiencies in our IND submission or in the conduct of these trials.

See also “Risks Related to the Clinical Testing, Regulatory Approval and Manufacturing of our Product Candidates— *Our product candidates are in various stages of clinical trials, which are very expensive and time-consuming. We cannot be certain when we will be able to submit a BLA, to the FDA and any failure or delay in completing clinical trials for our product candidates could harm our business.”*

We may not be able to commercialize any products, generate significant revenues, or attain profitability.

To date, none of our product candidates have been approved for commercial sale in any country. The process to develop, obtain regulatory approval for, and commercialize potential product candidates is long, complex, and costly. Unless and until we receive approval from the FDA and/or other foreign regulatory authorities for our product candidates, we cannot sell our products and will not have product revenues. Even if we obtain regulatory approval for one or more of our product candidates, if we are unable to successfully commercialize our products, we may not be able to generate sufficient revenues to achieve or maintain profitability, or to continue our business without raising significant additional capital, which may not be available. Our failure to achieve or maintain profitability could negatively impact the trading price of our common stock.

We have a limited operating history upon which to base an investment decision.

We have not demonstrated an ability to perform the functions necessary for the successful commercialization of any product candidates. The successful commercialization of any product candidates will require us to perform a variety of functions, including:

- Continuing to undertake preclinical development and clinical trials;
- Participating in regulatory approval processes;
- Formulating and manufacturing products; and
- Conducting sales and marketing activities.

Our operations have been limited to organizing and staffing our company, acquiring, developing and securing our proprietary product candidates, and undertaking preclinical and clinical trials of our product candidates. These operations provide a limited basis for you to assess our ability to commercialize our product candidates and the advisability of investing in our securities.

We may not be successful in establishing development and commercialization collaborations, which failure could adversely affect, and potentially prohibit, our ability to develop our product candidates.

Developing biopharmaceutical products and complementary technologies, conducting clinical trials, obtaining marketing approval, establishing manufacturing capabilities and marketing approved products is expensive and, therefore, we anticipate exploring collaborations with third parties that have alternative technologies, more resources and more experience than we do. In situations where we enter into a development and commercial collaboration arrangement for a product candidate or complementary technology, we may also seek to establish additional collaborations for development and commercialization in territories outside of those addressed by the first collaboration arrangement for such product candidate or technology. There are a limited number of potential partners, and we expect to face competition in seeking appropriate partners. If we are unable to enter into any development and commercial collaborations and/or sales and marketing arrangements on reasonable and acceptable terms, if at all, we may be unable to successfully develop and seek regulatory approval for our product candidates and/or effectively market and sell future approved products, if any, in some or all of the territories outside of the United States where it may otherwise be valuable to do so.

We may not be able to successfully manage our growth.

In the future, if we are able to advance our product candidates to the point of, and thereafter through, clinical trials, we will need to expand our development, regulatory, manufacturing, marketing and sales capabilities or contract with third parties to provide for these capabilities. Our future financial performance and our ability to commercialize our product candidates and to compete effectively will depend, in part, on our ability to manage any future growth effectively. To manage this growth, we must expand our facilities, augment our operational, financial and management systems, and hire and train additional qualified personnel. If we are unable to manage our growth effectively, our business may be harmed.

Our business will subject us to the risk of liability claims associated with the use of hazardous materials and chemicals.

Our contract research and development activities may involve the controlled use of hazardous materials and chemicals. Although we believe that our safety procedures for using, storing, handling and disposing of these materials comply with federal, state and local laws and regulations, we cannot completely eliminate the risk of accidental injury or contamination from these materials. In the event of such an accident, we could be held liable for any resulting damages and any liability could have a materially adverse effect on our business, financial condition, and results of operations. In addition, the federal, state and local laws and regulations governing the use, manufacture, storage, handling and disposal of hazardous or radioactive materials and waste products may require our contractors to incur substantial compliance costs that could materially adversely affect our business, financial condition, and results of operations.

****We will need to attract, recruit and hire key executives and we will continue to rely on key scientific and medical advisors, and their knowledge of our business and technical expertise would be difficult to replace.***

We have recently experienced significant turnover among our executive team and will need to attract and hire key executives to assist us in continuing to advance our business strategy. In February 2021, our Board appointed Heidi Hagen, formerly our lead independent director, as our interim Chief Executive Officer and principal executive officer to replace Dr. Laurence J.N. Cooper. In December 2020, Satyavrat Shukla resigned from his position as our Chief Financial Officer. On February 17, 2021, we appointed Timothy Cunningham as our interim Chief Financial Officer and principal financial officer. We have commenced searches for a new Chief Executive Officer and Chief Financial Officer; however, the marketplace for attracting senior executives, particularly in the biotech industry, is competitive and identifying and hiring new executives may take several months or longer. Management transition is often difficult and inherently causes some loss of institutional knowledge. The departure of these executives or an extended delay finding replacements may adversely affect our business, financial condition, and results of operations. Our ability to execute our business strategies may also be adversely affected by the uncertainty associated with these transitions.

In addition, we may not be able to attract or retain qualified management and commercial, scientific and clinical personnel due to the intense competition for qualified personnel among biotechnology, pharmaceutical and other businesses. If we are not able to attract and retain necessary personnel to accomplish our business objectives, we may experience constraints that will significantly impede the achievement of our development objectives, our ability to raise additional capital and our ability to implement our business strategy.

We are highly dependent on our principal scientific, regulatory, and medical advisors. The loss of any of our key personnel, could result in delays in product development, loss of key personnel or partnerships, and diversion of management resources, which could adversely affect our operating results. We do not carry “key person” life insurance policies on any of our officers or key employees.

If we are unable to hire additional qualified personnel, our ability to grow our business may be harmed.

We will need to hire additional qualified personnel with expertise in preclinical and clinical research and testing, government regulation, formulation and manufacturing, and eventually, sales and marketing. We compete for qualified individuals with numerous biopharmaceutical companies, universities, and other research institutions. Competition for such individuals is intense and we cannot be certain that our search for such personnel will be successful. Attracting and retaining qualified personnel will be critical to our success. If we are unable to hire additional qualified personnel, our ability to grow our business may be harmed.

We may incur substantial liabilities and may be required to limit commercialization of our products in response to product liability lawsuits.

The testing and marketing of medical products entail an inherent risk of product liability. If we cannot successfully defend ourselves against product liability claims, we may incur substantial liabilities or be required to limit commercialization of our products, if approved. Even a successful defense would require significant financial and management resources. Regardless of the merit or eventual outcome, liability claims may result in:

- Decreased demand for our product candidates;
- Injury to our reputation;
- Withdrawal of clinical trial participants;
- Withdrawal of prior governmental approvals;
- Costs of related litigation;
- Substantial monetary awards to patients;
- Product recalls;
- Loss of revenue; and
- The inability to commercialize our product candidates.

We currently carry clinical trial insurance and product liability insurance. However, an inability to renew our policies or to obtain sufficient insurance at an acceptable cost could prevent or inhibit the commercialization of pharmaceutical products that we develop, alone or with collaborators.

Our business and operations would suffer in the event of system failures.

Despite the implementation of security measures, our internal computer systems and those of our current and future contractors and consultants are vulnerable to damage from computer viruses, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. While we are not aware of any such material system failure, accident or security breach to date, if such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our development programs and our business operations. For example, the loss of clinical trial data from completed or future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. Likewise, we rely on third parties to manufacture our product candidates and conduct clinical trials, and similar events relating to their computer systems could also have a material adverse effect on our business. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and the further development and commercialization of our product candidates could be delayed.

RISKS RELATED TO THE CLINICAL TESTING, REGULATORY APPROVAL AND MANUFACTURING OF OUR PRODUCT CANDIDATES

If we are unable to obtain the necessary U.S. or worldwide regulatory approvals to commercialize any product candidate, our business will suffer.

We may not be able to obtain the approvals necessary to commercialize our product candidates, or any product candidate that we may acquire or develop in the future for commercial sale. We will need FDA approval to commercialize our product candidates in the United States and approvals from regulatory authorities in foreign jurisdictions equivalent to the FDA to commercialize our product candidates in those jurisdictions. In order to obtain FDA approval of any product candidate, we must submit to the FDA a Biologics License Application, or BLA, demonstrating that the product candidate is safe for humans and effective for its intended use. This demonstration requires significant research and animal tests, which are referred to as preclinical studies, as well as human tests, which are referred to as clinical trials. Satisfaction of the FDA's regulatory requirements typically takes many years, depending upon the

type, complexity, and novelty of the product candidate, and will require substantial resources for research, development, and testing. We cannot predict whether our research, development, and clinical approaches will result in products that the FDA will consider safe for humans and effective for their intended uses. The FDA has substantial discretion in the approval process and may require us to conduct additional preclinical and clinical testing or to perform post-marketing studies. The approval process may also be delayed by changes in government regulation, future legislation, or administrative action or changes in FDA policy that occur prior to or during our regulatory review. Delays in obtaining regulatory approvals may:

- Delay commercialization of, and our ability to derive product revenues from, our product candidates;
- Impose costly procedures on us; and
- Diminish any competitive advantages that we may otherwise enjoy.

Even if we comply with all FDA requests, the FDA may ultimately reject one or more of our BLAs. We cannot be sure that we will ever obtain regulatory approval for any of our product candidates. Failure to obtain FDA approval for our product candidates will severely undermine our business by leaving us without a saleable product, and therefore without any potential revenue source, until another product candidate can be developed. There is no guarantee that we will ever be able to develop or acquire another product candidate or that we will obtain FDA approval if we are able to do so.

In foreign jurisdictions, we similarly must receive approval from applicable regulatory authorities before we can commercialize any of our product candidates. Foreign regulatory approval processes generally include all of the risks associated with the FDA approval procedures described above.

Our product candidates are in various stages of clinical trials, which are very expensive and time-consuming. We cannot be certain when we will be able to submit a BLA to the FDA and any failure or delay in completing clinical trials for our product candidates could harm our business.

Our product candidates are in various stages of development and require extensive clinical testing. Notwithstanding our current clinical trial plans for each of our existing product candidates, we may not be able to commence additional trials or see results from these trials within our anticipated timelines. As they enter later stages of development, our product candidates generally will become subject to more stringent regulatory requirements, including the FDA's requirements for chemistry, manufacturing and controls for product candidates entering Phase 3 clinical trials. There is no guarantee the FDA will allow us to commence Phase 3 clinical trials for product candidates studied in early clinical trials.

If the FDA does not allow our product candidates to enter later stage clinical trials, or requires changes to the formulation or manufacture of our product candidates before commencing Phase 3 clinical trials, our ability to further develop, or seek approval for, such product candidates may be materially impacted. As such, we cannot predict with any certainty if or when we might submit a BLA for regulatory approval of our product candidates or whether such a BLA will be accepted. Because we do not anticipate generating revenues unless and until we submit one or more BLAs and thereafter obtain requisite FDA approvals, the timing of our BLA submissions and FDA determinations regarding approval thereof, will directly affect if and when we are able to generate revenues.

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

As with many pharmaceutical and biological products, treatment with our product candidates may produce undesirable side effects or adverse reactions or events, including potential adverse side effects related to cytokine release. If our product candidates or similar products or product candidates under development by third parties demonstrate unacceptable AEs, we may be required to halt or delay further clinical development of our product candidates. The FDA or other foreign regulatory authorities could order us to cease further development of or deny approval of our product candidates for any or all targeted indications.

The product-related side effects could affect patient recruitment or the ability of enrolled patients to complete the trial or result in potential product liability claims. In addition, these side effects may not be appropriately or timely recognized or managed by the treating medical staff, particularly outside of the institutions that collaborate with us, as toxicities resulting from our novel technologies may not be normally encountered in the general patient population and by medical personnel. We expect to have to train medical personnel using our product candidates to understand their side effect profiles, both for our planned clinical trials and upon any commercialization of any product candidates. Inadequate training in recognizing or managing the potential side effects of our product candidates could result in adverse effects to patients, including death.

Additionally, if one or more of our product candidates receives marketing approval, and we or others later identify undesirable side effects caused by such products, including during any long-term follow-up observation period recommended or required for patients who receive treatment using our products, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw approvals of such product;
- regulatory authorities may require additional warnings on the label;
- we may be required to create a risk evaluation and mitigation strategy plan, which could include a medication guide outlining the risks of such side effects for distribution to patients, a communication plan for healthcare providers, and/or other elements to assure safe use;
- we could be sued and held liable for harm caused to patients; and
- our reputation may suffer.

Any of the foregoing could prevent us from achieving or maintaining market acceptance of the particular product candidate, if approved. Furthermore, any of these occurrences may harm our business, financial condition and prospects significantly.

Our cell-based and gene therapy immuno-oncology products rely on the availability of reagents, specialized equipment, and other specialty materials and infrastructure, which may not be available to us on acceptable terms or at all. For some of these reagents, equipment, and materials, we rely or may rely on sole source vendors or a limited number of vendors, which could impair our ability to manufacture and supply our products.

Manufacturing our product candidates will require many reagents, which are substances used in our manufacturing processes to bring about chemical or biological reactions, and other specialty materials and equipment, some of which are manufactured or supplied by small companies with limited resources and experience to support commercial biologics production. We currently depend on a limited number of vendors for certain materials and equipment used in the manufacture of our product candidates. Some of these suppliers may not have the capacity to support commercial products manufactured under current good manufacturing practices by biopharmaceutical firms or may otherwise be ill-equipped to support our needs. We also do not have supply contracts with many of these suppliers and may not be able to obtain supply contracts with them on acceptable terms or at all. Accordingly, we may experience delays in receiving key materials and equipment to support clinical or commercial manufacturing.

For some of these reagents, equipment, infrastructure, and materials, we rely and may in the future rely on sole source vendors or a limited number of vendors. An inability to continue to source product from any of these suppliers, which could be due to regulatory actions or requirements affecting the supplier, adverse financial or other strategic developments experienced by a supplier, labor disputes or shortages, unexpected demands, or quality issues, could adversely affect our ability to satisfy demand for our product candidates, which could adversely and materially affect our product sales and operating results or our ability to conduct clinical trials, either of which could significantly harm our business.

In addition, some of the reagents and products used by us, including in our clinical trials, may be stored at a single vendor. The loss of materials located at a single vendor, or the failure of such a vendor to manufacture clinical product in accordance with our specifications, would impact our ability to conduct ongoing or planned clinical trials and continue the development of our products. Further, manufacturing replacement material may be expensive and require a significant amount of time, which may further impact our clinical programs.

As we continue to develop and scale our manufacturing process, we expect that we will need to obtain rights to and supplies of certain materials and equipment to be used as part of that process. We may not be able to obtain rights to such materials on commercially reasonable terms, or at all, and if we are unable to alter our process in a commercially viable manner to avoid the use of such materials or find a suitable substitute, it would have a material adverse effect on our business. Even if we are able to alter our process so as to use other materials or equipment, such a change may lead to a delay in our clinical development and/or commercialization plans. If such a change occurs for product candidate that is already in clinical testing, the change may require us to perform both ex vivo comparability studies and to collect additional data from patients prior to undertaking more advanced clinical trials.

The results of our clinical trials may not support our product candidate claims.

Even if our clinical trials are completed as planned, we cannot be certain that their results will support approval of our product candidates. The FDA normally expects two randomized, well-controlled Phase 3 pivotal trials in support of approval of a BLA. Success in preclinical testing and early clinical trials does not ensure that later clinical trials will be successful, and we cannot be certain that the results of later clinical trials will replicate the results of prior clinical trials and preclinical testing. The clinical trial process may fail to demonstrate that our product candidates are safe for humans and effective for the indicated uses. This failure would cause us to abandon a product candidate and may delay development of other product candidates. Any delay in, or termination

of, our clinical trials will delay the submission of our BLAs with the FDA and, ultimately, our ability to commercialize our product candidates and generate product revenues. In addition, our clinical trials involve small patient populations. Because of the small sample size, the results of these clinical trials may not be indicative of future results.

Our immuno-oncology product candidates are based on a novel technology, which makes it difficult to predict the time and cost of product candidate development and subsequently obtaining regulatory approval. Currently, a limited number of gene therapy and cell therapy products have been approved in the United States and Europe.

We are currently focused on developing products in immuno-oncology that employ novel gene expression, control and cell technologies to deliver safe, effective and scalable cell- and viral-based therapies for the treatment of cancer. Due to the novelty of this technology, there can be no assurance that any development problems we experience in the future related to our immuno-oncology platforms will not cause significant delays or unanticipated costs, or that such development problems can be solved. We may also experience unanticipated problems or delays in expanding our manufacturing capacity or transferring our manufacturing process to commercial partners, which may prevent us from completing our clinical trials or commercializing our immuno-oncology product candidates on a timely or profitable basis, if at all.

In addition, the clinical study requirements of the FDA, the EMA and other regulatory agencies and the criteria these regulators use to determine the safety and efficacy of a product candidate vary substantially according to the type, complexity, novelty and intended use and market of the potential products. The regulatory approval process for novel product candidates such as ours can be more expensive and take longer than for other, better known or extensively studied pharmaceutical or other product candidates. These factors make it difficult to determine how long it will take or how much it will cost to obtain regulatory approvals for our product candidates in either the United States or Europe. Approvals by the EMA may not be indicative of what the FDA may require for approval.

Regulatory requirements governing gene and cell therapy products have changed frequently and may continue to change in the future. For example, the FDA has established the Office of Tissue and Advanced Therapies within its Center for Biologics Evaluation and Research, or CBER, to consolidate the review of gene therapy and related products, and the Cellular, Tissue and Gene Therapies Advisory Committee to advise CBER on its review. Also, before a clinical trial can begin at an institution, that institution’s institutional review board, or IRB, and its Institutional Biosafety Committee will have to review the proposed clinical trial to assess the safety of the trial. In addition, adverse developments in clinical trials of gene therapy products conducted by others may cause the FDA or other regulatory bodies to change the requirements for approval of any of our product candidates.

These regulatory review committees and advisory groups and the new guidelines they promulgate may lengthen the regulatory review process, require us to perform additional studies, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of these treatment candidates or lead to significant post-approval limitations or restrictions. As we advance our immuno-oncology product candidates, we will be required to consult with these regulatory and advisory groups, and comply with applicable guidelines. If we fail to do so, we may be required to delay or discontinue development of our product candidates. These additional processes may result in a review and approval process that is longer than we otherwise would have expected for oncology product candidates. Delay or failure to obtain, or unexpected costs in obtaining, the regulatory approval necessary to bring a potential product to market could decrease our ability to generate sufficient product revenue to maintain our business.

Because we are dependent upon clinical research institutions and other contractors for clinical testing and for research and development activities, the results of our clinical trials and such research activities are, to a certain extent, beyond our control.

We materially rely upon independent investigators and collaborators, such as universities and medical institutions, to conduct our preclinical and clinical trials under agreements with us. These collaborators are not our employees and we cannot control the amount or timing of resources that they devote to our programs. These investigators may not assign as great a priority to our programs or pursue them as diligently as we would if we were undertaking such programs ourselves. If outside collaborators fail to devote sufficient time and resources to our product development programs, or if their performance is substandard, the approval of our FDA applications, if any, and our introduction of new products, if any, will be delayed. These institutions may also have, or implement in the future, policies and procedures that limit their ability to advance our programs. For instance, our partners may take measures in response to the COVID-19 pandemic, that may impact enrollment in our clinical trials. These collaborators may also have relationships with other commercial entities, some of whom may compete with us. If our collaborators assist our competitors to our detriment, our competitive position would be harmed.

Our reliance on third parties to formulate and manufacture our product candidates exposes us to a number of risks that may delay the development, regulatory approval and commercialization of our products or result in higher product costs.

We have limited experience in biopharmaceutical manufacturing. We currently lack the internal resources and expertise to formulate or manufacture our own product candidates and, therefore, contract the manufacture of our product candidates with third parties. We intend to contract with one or more manufacturers to manufacture, supply, store, and distribute supplies for our clinical trials. If a product candidate we develop or acquire in the future receives FDA approval, we may rely on one or more third-party contractors to manufacture our products. Our anticipated future reliance on a limited number of third-party manufacturers exposes us to the following risks:

- We may be unable to identify manufacturers on acceptable terms or at all because the number of potential manufacturers is limited and the FDA must approve any replacement contractor. This approval would require new testing and compliance inspections. In addition, a new manufacturer would have to be educated in, or develop substantially equivalent processes for, production of our products after receipt of FDA approval, if any.
- Our third-party manufacturers might be unable to formulate and manufacture our products in the volume and of the quality required to meet our clinical needs and commercial needs, if any.
- Resources at 3rd party manufacturers should be called out here. For example, competition for these scare resources, skills required, and on going training/certifications of employees.
- Our future contract manufacturers may not perform as agreed or may not remain in the contract manufacturing business for the time required to supply our clinical trials or to successfully produce, store, and distribute our products.
- Biopharmaceutical manufacturers are subject to ongoing periodic unannounced inspection by the FDA, the Drug Enforcement Administration and corresponding state and foreign agencies to ensure strict compliance with current good manufacturing practices, or cGMP, and other government regulations and corresponding foreign standards. We do not have control over third-party manufacturers' compliance with these regulations and standards.
- If any third-party manufacturer makes improvements in the manufacturing process for our products, we may not own, or may have to share, the intellectual property rights to the innovation.
- Further third-party manufacturers may encounter difficulties in achieving volume production, quality control, and quality assurance and also may experience shortages in qualified personnel and obtaining materials for our product candidates, including delays or shortages due to limited supply or capacity of production facilities as a result of the recent COVID-19 pandemic.
- Our third-party manufacturers may not be able to comply with cGMP regulations or similar regulatory requirements outside the United States. Our failure, or the failure of our third-party manufacturers, to comply with applicable regulations could result in sanctions being imposed on us, including clinical holds, fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocation, seizures or recalls of products, operating restrictions and criminal prosecutions, any of which could significantly and adversely affect supplies of our products.

Each of these risks could delay our clinical trials, the approval, if any, of our product candidates by the FDA or the commercialization of our product candidates or result in higher costs or deprive us of potential product revenues.

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

Any product candidate for which we obtain marketing approval, along with the manufacturing processes, post-approval clinical data, labeling, advertising and promotional activities for such product, will be subject to continual requirements of and review by the FDA and other regulatory authorities. These requirements include, among other things, submissions of safety and other post-marketing information and reports, registration and listing requirements, cGMP requirements relating to manufacturing, quality control, quality assurance and corresponding maintenance of records and documents, requirements regarding the distribution of samples to physicians and recordkeeping. Even if marketing approval of a product candidate is granted, the approval may be subject to limitations on the indicated uses for which the product may be marketed or to the conditions of approval, including the requirement to implement a risk evaluation and mitigation strategy, or REMS, which could include requirements for a restricted distribution system. If any of our product candidates receives marketing approval, the accompanying label may limit the approved uses, which could limit sales of the product.

The FDA may also impose requirements for costly post-marketing studies or clinical trials and surveillance to monitor the safety or efficacy of our approved products. The FDA closely regulates the post-approval marketing and promotion of products to ensure that

they are marketed only for the approved indications and in accordance with the provisions of the approved labeling. However, companies may share truthful and not misleading information that is otherwise consistent with the labeling. The FDA imposes stringent restrictions on manufacturers' communications regarding off-label use and if we market our products outside of their approved indications, we may be subject to enforcement action for off-label marketing. Violations of the Federal Food, Drug and Cosmetic Act relating to the promotion of prescription drugs may lead to investigations alleging violations of federal and state health care fraud and abuse laws, as well as state consumer protection laws.

In addition, later discovery of previously unknown AEs or other problems with our products, manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may yield various results, including:

- Litigation involving patients taking our product;
- Restrictions on such products, manufacturers or manufacturing processes;
- Restrictions on the labeling or marketing of a product;
- Restrictions on product distribution or use;
- Requirements to conduct post-marketing studies or clinical trials;
- Warning letters;
- Withdrawal of the products from the market;
- Refusal to approve pending applications or supplements to approved applications that we submit;
- Recall of products;
- Fines, restitution or disgorgement of profits or revenues;
- Suspension or withdrawal of marketing approvals;
- Damage to relationships with existing and potential collaborators;
- Unfavorable press coverage and damage to our reputation;
- Refusal to permit the import or export of our products;
- Product seizure; or
- Injunctions or the imposition of civil or criminal penalties.

Noncompliance with requirements regarding safety monitoring or pharmacovigilance can also result in significant financial penalties. Similarly, failure to comply with U.S. and foreign regulatory requirements regarding the development of products for pediatric populations and the protection of personal health information can also lead to significant penalties and sanctions.

RISKS RELATED TO OUR ABILITY TO COMMERCIALIZE OUR PRODUCT CANDIDATES

If we are unable either to create sales, marketing and distribution capabilities or enter into agreements with third parties to perform these functions, we will be unable to commercialize our product candidates successfully.

We currently have no marketing, sales, or distribution capabilities. If, and when we become reasonably certain that we will be able to commercialize our current or future product candidates, we anticipate allocating resources to the marketing, sales and distribution of our proposed products in North America and in certain other countries; however, we cannot assure that we will be able to market, sell, and distribute our products successfully. Our future success also may depend, in part, on our ability to enter into and maintain collaborative relationships for such capabilities and to encourage the collaborator's strategic interest in the products under development, and such collaborator's ability to successfully market and sell any such products. Although we intend to pursue certain collaborative arrangements regarding the sale and marketing of certain of our product candidates, there are no assurances that we will be able to establish or maintain collaborative arrangements or, if we are able to do so, whether we would be able to conduct our own sales efforts. There can also be no assurance that we will be able to establish or maintain relationships with third-party collaborators or develop in-house sales and distribution capabilities. To the extent that we depend on third parties for marketing and distribution, any revenues we receive will depend upon the efforts of such third parties, and there can be no assurance that such efforts will be successful. In addition, there can also be no assurance that we will be able to market and sell our product candidates in the United States or overseas.

If we are not able to partner with a third party and are not successful in recruiting sales and marketing personnel or in building a sales and marketing infrastructure, we will have difficulty commercializing our product candidates, which would harm our business. If we

rely on pharmaceutical or biotechnology companies with established distribution systems to market our products, we will need to establish and maintain partnership arrangements, and we may not be able to enter into these arrangements on acceptable terms or at all. To the extent that we enter into co-promotion or other arrangements, any revenues we receive will depend upon the efforts of third parties that may not be successful and that will be only partially in our control.

If we cannot compete successfully for market share against other biopharmaceutical companies, we may not achieve sufficient product revenues and our business will suffer.

The market for our product candidates is characterized by intense competition and rapid technological advances. If a product candidate receives FDA approval, it will compete with a number of existing and future products and therapies developed, manufactured and marketed by others. Existing or future competing products may provide greater therapeutic convenience or clinical or other benefits for a specific indication than our products or may offer comparable performance at a lower cost. If our products fail to capture and maintain market share, we may not achieve sufficient product revenues and our business will suffer.

We will compete against fully integrated pharmaceutical companies and smaller companies that are collaborating with larger pharmaceutical companies, academic institutions, government agencies and other public and private research organizations. Many of these competitors have products already approved or in development. In addition, many of these competitors, either alone or together with their collaborative partners, operate larger research and development programs or have substantially greater financial resources than we do, as well as significantly greater experience in:

- Developing drugs and biopharmaceuticals;
- Undertaking preclinical testing and human clinical trials;
- Obtaining FDA and other regulatory approvals of drugs and biopharmaceuticals;
- Formulating and manufacturing drugs and biopharmaceuticals; and
- Launching, marketing, and selling drugs and biopharmaceuticals.

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

If physicians and patients do not accept and use our product candidates, our ability to generate revenue from sales of our products will be materially impaired.

Even if the FDA and/or foreign equivalents thereof approve our product candidates, physicians and patients may not accept and use them. Acceptance and use of our products will depend upon a number of factors including:

- Perceptions by members of the healthcare community, including physicians, about the safety and effectiveness of our products;
- Pharmacological benefit and cost-effectiveness of our products relative to competing products;
- Availability of coverage and adequate reimbursement for our products from government or other third-party payors;
- Effectiveness of marketing and distribution efforts by us and our licensees and distributors, if any; and
- The price at which we sell our products.

Because we expect sales of our current product candidates, if approved, to generate substantially all of our product revenues for the foreseeable future, the failure of a product to find market acceptance would harm our business and could require us to seek additional financing in order to fund the development of future product candidates.

Our ability to generate product revenues will be diminished if our products do not obtain coverage and adequate reimbursement from payors.

Our ability to commercialize our product candidates, if approved, alone or with collaborators, will depend in part on the extent to which coverage and reimbursement will be available from third-party payors, including government and health administration authorities, private health maintenance organizations and health insurers and other payors.

Patients who are prescribed medicine for the treatment of their conditions generally rely on third-party payors to reimburse all or part of the costs associated with their prescription drugs. Sufficient coverage and adequate reimbursement from third-party payors are critical to new product acceptance. Coverage decisions may depend upon clinical and economic standards that disfavor new drug products when more established or lower cost therapeutic alternatives are already available or subsequently become available. It is difficult to predict the coverage and reimbursement decisions that will be made by third-party payors for novel gene and cell therapy products such as ours. Even if we obtain coverage for our product candidates, the resulting reimbursement payment rates might not be adequate or may require co-payments that patients find unacceptably high. Patients are unlikely to use our product candidates unless coverage is provided and reimbursement is adequate to cover a significant portion of the cost of our product candidates.

In addition, the market for our product candidates for which we may receive regulatory approval will depend significantly on access to third-party payors' drug formularies or lists of medications for which third-party payors provide coverage and reimbursement, which might not include all of the FDA-approved drugs for a particular indication. The industry competition to be included in such formularies often leads to downward pricing pressures on pharmaceutical companies. Also, third-party payors may refuse to include a particular branded drug in their formularies or otherwise restrict patient access to a branded drug when a less costly generic equivalent or other alternative is available.

Third-party payors, whether foreign or domestic, or governmental or commercial, are developing increasingly sophisticated methods of controlling healthcare costs. In addition, in the United States, no uniform policy of coverage and reimbursement for drug products exists among third-party payors. Therefore, coverage and reimbursement for drug products can differ significantly from payor to payor. As a result, the coverage determination process is often a time-consuming and costly process that requires us to provide scientific and clinical support for the use of our products to each payor separately, with no assurance that approval will be obtained. If we are unable to obtain coverage of and adequate payment levels for our product candidates from third-party payors, physicians may limit how much or under what circumstances they will prescribe or administer our products and patients may decline to purchase them. This in turn could affect our ability to successfully commercialize our products and impact our profitability, results of operations, financial condition, and future success.

In addition, in many foreign countries, particularly the countries of the European Union, or EU, the pricing of prescription drugs is subject to government control. In some non-U.S. jurisdictions, 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 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. We may face competition for our product candidates from lower-priced products in foreign countries that have placed price controls on pharmaceutical products. In addition, there may be importation of foreign products that compete with our own products, which could negatively impact our profitability.

The market opportunities for our product candidates may be limited to those patients who are ineligible for or have failed prior treatments and may be small.

Cancer therapies are sometimes characterized as first line, second line, or third line, and the FDA often approves new therapies initially only for third line use. When cancer is detected early enough, first line therapy is sometimes adequate to cure the cancer or prolong life without a cure. Whenever first line therapy, usually chemotherapy, hormone therapy, surgery, or a combination of these, proves unsuccessful, second line therapy may be administered. Second line therapies often consist of more chemotherapy, radiation, antibody drugs, tumor targeted small molecules, or a combination of these. Third line therapies can include bone marrow transplantation, antibody and small molecule targeted therapies, more invasive forms of surgery, and new technologies. We expect to initially seek approval of our product candidates as a third line therapy for patients who have failed other approved treatments.

Subsequently, for those products that prove to be sufficiently beneficial, if any, we would expect to seek approval as a second line therapy and potentially as a first line therapy, but there is no guarantee that our product candidates, even if approved, would be approved for second line or first line therapy. In addition, we may have to conduct additional clinical trials prior to gaining approval for second line or first line therapy.

Our projections of both the number of people who have the cancers we are targeting, as well as the subset of people with these cancers in a position to receive therapy and who have the potential to benefit from treatment with our product candidates, are based on our beliefs and estimates. These estimates have been derived from a variety of sources, including scientific literature, surveys of clinics, patient foundations, or market research and may prove to be incorrect. Further, new studies may change the estimated incidence or prevalence of these cancers. The number of patients may turn out to be lower than expected. Additionally, the potentially addressable patient population for our product candidates may be limited or may not be amenable to treatment with our product candidates.

Our market opportunities may also be limited by competitor treatments that may enter the market. See also "Risks Related to Our Ability to Commercialize Our Product Candidates—*If we cannot compete successfully for market share against other biopharmaceutical companies, we may not achieve sufficient product revenues and our business will suffer*."

Healthcare legislative reform measures may have a material adverse effect on our business and results of operations.

In both the United States and certain foreign jurisdictions, there have been a number of legislative and regulatory enactments in recent years that change the healthcare system in ways that could impact our future ability to sell our product candidates profitably.

Furthermore, there have been and continue to be a number of initiatives at the federal and state level that seek to reduce healthcare costs. Most significantly, in March 2010, President Obama signed into law the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or collectively the ACA, which included measures that have significantly changed the way healthcare is financed by both governmental and private insurers. Among the provisions of the ACA of importance to the pharmaceutical industry are the following:

- Created an annual, nondeductible fee on any entity that manufactures or imports certain branded prescription drugs and biologic agents, apportioned among these entities according to their market share in certain government healthcare programs;
- Increased the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program to 23.1% and 13% of the average manufacturer price for most branded and generic drugs, respectively;
- Created a new Medicare Part D coverage gap discount program, in which manufacturers must now agree to offer 70% point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D;
- Extended manufacturers' Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations;
- Created new methodologies by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected, and for drugs that are line extensions;
- Expanded eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to additional individuals with income at or below 133% of the Federal Poverty Level, thereby potentially increasing both the volume of sales and manufacturers' Medicaid rebate liability;
- Expanded the entities eligible for discounts under the Public Health Service pharmaceutical pricing program;
- Created a new requirement to annually report drug samples that certain manufacturers and authorized distributors provide to physicians;
- Expanded healthcare fraud and abuse laws, including the False Claims Act and the federal Anti-Kickback Statute, new government investigative powers, and enhanced penalties for noncompliance;
- Created a licensure framework for follow-on biologic products;
- Created new requirements under the federal Physician Payments Sunshine Act for certain drug manufacturers to annually report information related to payments and other transfers of value made to physicians, as defined by such law, and teaching hospitals as well as ownership or investment interests held by physicians and their immediate family members;
- Created a Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research; and
- Established a Center for Medicare & Medicaid Innovation at the Centers for Medicare & Medicaid Services, or CMS, to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending.

There have been executive, legal and political challenges to certain aspects of the ACA. For example, President Trump signed several executive orders and other directives designed to delay, circumvent, or loosen certain requirements mandated by the ACA. Concurrently, Congress considered legislation to repeal or repeal and replace all or part of the ACA. While Congress has not passed comprehensive repeal legislation, several bills affecting the implementation of certain taxes under the ACA have been signed into law. In December 2017, Congress repealed the tax penalty, effective January 1, 2019, for an individual's failure to maintain ACA-mandated health insurance as part of the Tax Cuts and Jobs Act of 2017, or Tax Act. On June 17, 2021, the U.S. Supreme Court dismissed a challenge on procedural grounds that argued that ACA is unconstitutional in its entirety because the "individual mandate"

was repealed by Congress. Thus, the ACA will remain in effect in its current form. Further, prior to the U.S. Supreme Court ruling on January 28, 2021, President Biden issued an executive order that initiated a special enrollment period for purposes of obtaining health insurance coverage through the ACA marketplace, which began on February 15, 2021 and will remain open through August 15, 2021. The executive order also instructed certain governmental agencies to review and reconsider their existing policies and rules that limit access to healthcare, including among others, reexamining Medicaid demonstration projects and waiver programs that include work requirements, and policies that create unnecessary barriers to obtaining access to health insurance coverage through Medicaid or the ACA. It is possible that the ACA will be subject to judicial or Congressional challenges in the future. It is unclear how any such challenges and the healthcare reform measures of the Biden administration will impact ACA and our business. The ultimate content, timing or effect of any healthcare reform measures on the U.S. healthcare industry is unclear.

Further, there has been increasing legislative and enforcement interest in the United States with respect to specialty drug pricing practices. As a result, there have been several U.S. Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs. At the federal level, the Trump administration used several means to propose or implement drug pricing reform, including through federal budget proposals, executive orders and policy initiatives. For example, on July 24, 2020 and September 13, 2020, the Trump administration announced several executive orders related to prescription drug pricing that attempt to implement several of the administration's proposals.

The FDA also released a final rule, effective November 30, 2020, implementing a portion of the importation executive order providing guidance for states to build and submit importation plans for drugs from Canada. Further, on November 20, 2020, HHS finalized a regulation removing safe harbor protection for price reductions from pharmaceutical manufacturers to plan sponsors under Part D, either directly or through pharmacy benefit managers, unless the price reduction is required by law. The implementation of the rule has been delayed by the Biden administration from January 1, 2022 to January 1, 2023 in response to ongoing litigation. The rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a new safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers, the implementation of which have also been delayed until January , 2023. On November 20, 2020, CMS issued an interim final rule implementing President Trump's Most Favored Nation executive order, which would tie Medicare Part B payments for certain physician-administered drugs to the lowest price paid in other economically advanced countries, effective January 1, 2021. On December 28, 2020, the United States District Court for the Northern District of California issued a nationwide preliminary injunction against implementation of the interim final rule. On January 13, 2021, in a separate lawsuit brought by industry groups in the U.S. District of Maryland, the government defendants entered into a joint motion to stay the litigation on the condition that the government would not appeal the preliminary injunction granted in the U.S. District Court for the Northern District of California and that performance for any final regulation stemming from the MFN Model interim final rule shall not commence earlier than sixty (60) days after publication of that regulation in the Federal Register. Individual states in the United States have also increasingly passed legislation and implemented regulations designed to control pharmaceutical 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.

It is possible that additional governmental action is taken in response to the COVID-19 pandemic.

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

If we fail to comply with federal and state healthcare laws, including fraud and abuse and health information privacy and security laws, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.

As a pharmaceutical company, even though we do not and will not control referrals of healthcare services or bill directly to Medicare, Medicaid or other third-party payors, certain federal and state healthcare laws and regulations pertaining to fraud and abuse and patients' rights are and will be applicable to our business. For example, we could be subject to healthcare fraud and abuse and patient privacy regulation by both the federal government and the states in which we conduct our business. The laws that may affect our ability to operate include, among others:

- The federal Anti-Kickback Statute, which regulates our business activities, including our marketing practices, educational programs, pricing policies, and relationships with healthcare providers or other entities, by prohibiting, among other things, soliciting, receiving, offering or paying remuneration, directly or indirectly, to induce, or in return

for, either the referral of an individual or the purchase or recommendation of an item or service reimbursable under a federal healthcare program, such as the Medicare and Medicaid programs;

- Federal civil and criminal false claims laws, including the False Claims Act which permits a private individual acting as a "whistleblower" to bring actions on behalf of the federal government alleging violations of the False Claims Act, and civil monetary penalty laws, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, claims for payment from Medicare, Medicaid, or other third-party payors that are false or fraudulent;
- The federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which created new federal civil and criminal statutes that prohibit, among other things, executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, or HITECH, and their implementing regulations, which imposes certain requirements relating to the privacy, security and transmission of individually identifiable health information on entities and individuals subject to the law including certain healthcare providers, health plans, and healthcare clearinghouses, known as covered entities, as well as individuals and entities that perform services for them which involve the use, or disclosure of, individually identifiable health information, known as business associates and their subcontractors that use, disclose or otherwise process individually identifiable health information;
- Requirements under the Physician Payments Sunshine Act to report annually to CMS certain financial arrangements with physicians, (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, as defined in the ACA and its implementing regulations, including reporting any "transfer of value" made or distributed to teaching hospitals, and physicians, as defined by such law and reporting any ownership and investment interests held by physicians and their immediate family members and applicable group purchasing organizations during the preceding calendar year, which will be expanded beginning in 2022, to require applicable manufacturers to report such information regarding its relationships with physician assistants, nurse practitioners, clinical nurse specialists, anesthesiologist assistants, certified registered nurse anesthetists and certified nurse midwives during the previous year; and
- State and foreign law equivalents of each of the above federal laws, such as anti-kickback and false claims laws which may apply to items or services reimbursed by any third-party payor, including commercial insurers; state laws that require pharmaceutical companies to comply with the industry's voluntary compliance guidelines and the applicable compliance guidance promulgated by the federal government that otherwise restricts certain payments that may be made to healthcare providers and entities; state laws that require drug manufacturers to report information related to payments and other transfer of value to physicians and other healthcare providers and entities; state laws that require the reporting of information related to drug pricing; state and local laws that require the registration of pharmaceutical sales representatives; and state and foreign laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Because of the breadth of these laws and the narrowness of the statutory exceptions and safe harbors available, it is possible that some of our business activities, including our consulting agreements with physicians, some of whom receive stock or stock options as compensation for their services, could be subject to challenge under one or more of such laws. In addition, recent health care reform legislation has further strengthened these laws. For example, the ACA, among other things, amended the intent requirement of the federal Anti-Kickback Statute and certain criminal healthcare fraud statutes. A person or entity no longer needs to have actual knowledge of this statute or specific intent to violate it. Moreover, the ACA provides that the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act.

To the extent that any of our product candidates is ultimately sold in a foreign country, we may be subject to similar foreign laws and regulations.

Efforts to ensure that our business arrangements comply with applicable healthcare laws involve substantial costs. It is possible that governmental and enforcement authorities will conclude that our business practices do not comply with current or future statutes, regulations or case law interpreting applicable fraud and abuse or other healthcare laws and regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, we may be subject to significant penalties, including administrative, civil and criminal penalties, damages, fines, exclusion from participation in United States federal or state health care programs, such as Medicare and Medicaid, disgorgement, imprisonment, integrity oversight and reporting obligations, and the curtailment or restructuring of our operations any of which could materially adversely affect our ability to operate our business and our financial results. Although compliance programs can mitigate the risk of investigation and prosecution for

violations of these laws, the risks cannot be entirely eliminated. 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 divert our management's attention from the operation of our business. Moreover, achieving and sustaining compliance with applicable federal and state privacy, security and fraud laws may prove costly.

Our immuno-oncology product candidates may face competition in the future from biosimilars and/or new technologies.

The Biologics Price Competition and Innovation Act of 2009, or BPCIA, provides an abbreviated pathway for the approval of follow-on biological products. Under the BPCIA, an application for a biosimilar product cannot be approved by the FDA until 12 years after the original branded product was approved under a BLA. However, there is a risk that the U.S. Congress could amend the BPCIA to significantly shorten this exclusivity period, potentially creating the opportunity for generic competition sooner than anticipated. Further, this data exclusivity does not prevent another company from developing a product that is highly similar to the original branded product, generating its own data and seeking approval. Data exclusivity only assures that another company cannot rely upon the data within the innovator's application to support the biosimilar product's approval.

We rely significantly on information technology and any failure, inadequacy, interruption or security lapse of that technology or loss of data, including any cyber security incidents, could compromise sensitive information related to our business, prevent us from accessing critical information or expose us to liability which could harm our ability to operate our business effectively and adversely affect our business and reputation.

In the ordinary course of our business, we, our contract research organizations and other third parties on which we rely collect and store sensitive data, including legally protected patient health information, personally identifiable information about our employees, intellectual property, and proprietary business information. We manage and maintain our applications and data utilizing on-site systems. These applications and data encompass a wide variety of business-critical information including research and development information and business and financial information.

The secure processing, storage, maintenance and transmission of this critical information is vital to our operations and business strategy. Because of the work-from-home policies we implemented due to COVID-19, information that is normally protected, including company confidential information, may be less secure. Additionally, despite the implementation of security measures, our internal computer systems and those of third parties with which we contract are vulnerable to damage from cyber-attacks, computer viruses, breaches, unauthorized access, interruptions due to employee error or malfeasance or other disruptions, or damage from natural disasters, terrorism, war and telecommunication and electrical failures. In addition, due to the COVID-19 pandemic, we have enabled many of our employees to work remotely, which may make us more vulnerable to cyberattacks. Any such event could compromise our networks and the information stored there could be accessed by unauthorized parties, publicly disclosed, lost or stolen. We have measures in place that are designed to detect and respond to such security incidents and breaches of privacy and security mandates. Any such access, disclosure or other loss of information could result in legal claims or proceedings, liability under laws that protect the privacy of personal information, government enforcement actions and regulatory penalties. Unauthorized access, loss or dissemination could also disrupt our operations, including our ability to conduct research, development and commercialization activities, process and prepare company financial information, manage various general and administrative aspects of our business and damage our reputation, in addition to possibly requiring substantial expenditures of resources to remedy, any of which could adversely affect our business. The loss of clinical trial data could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. In addition, there can be no assurance that we will promptly detect any such disruption or security breach, if at all. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and our research, development and commercialization efforts could be delayed.

RISKS RELATED TO OUR INTELLECTUAL PROPERTY

If we or our licensors fail to adequately protect or enforce our intellectual property rights or secure rights to patents of others, the value of our intellectual property rights would diminish and our ability to successfully commercialize our products may be impaired.

Our success, competitive position, and future revenues will depend in part on our ability and the abilities of our licensors to obtain and maintain patent protection for our products, methods, processes and other technologies, to preserve confidential information, including trade secrets, to prevent third parties from infringing our proprietary rights, and to operate without infringing the proprietary rights of third parties.

To date, we have exclusive rights in the field of cancer treatment to certain U.S. and foreign intellectual property with respect to certain cell therapy and related technologies from MD Anderson and NCI, as well as with respect to the PGEN technology, including Ad-RTS-IL-12 plus veledimex. Under the MD Anderson License, future filings and applications require the agreement of each of MD Anderson, PGEN and us, and MD Anderson has the right to control the preparation and filing of additional patent applications unless

the parties agree that we or PGEN may prosecute the application directly. Although under the agreement MD Anderson has agreed to review and incorporate any reasonable comments that we or PGEN may have regarding licensed patents and patent applications, we cannot guarantee that our comments will be solicited or followed. Under the patent license agreement with the NCI, the NCI is responsible for the preparation, filing, prosecution, and maintenance of patent applications or patents licensed to us. Although under the agreement, the NCI is required to consult with us in the preparation, filing, prosecution, and maintenance of all patent applications or patents licensed to us, we cannot guarantee that our comments will be solicited or followed. Under our License Agreement with PGEN, PGEN has the right, but not the obligation, to prepare, file, prosecute, and maintain the patents and patent applications licensed to us and shall bear any related costs incurred by it in regard to those actions. PGEN is required to consult with us and keep us reasonably informed of the status of the patents and patent applications licensed to us, and to confer with us prior to submitting any related filings and correspondence. Although under the agreement PGEN has agreed to consider in good faith and consult with us regarding any comments we may have regarding these patents and patent applications, we cannot guarantee that our comments will be solicited or followed. Without direct control of the in-licensed patents and patent applications, we are dependent on MD Anderson, the NCI or PGEN, as applicable, to keep us advised of prosecution, particularly in foreign jurisdictions where prosecution information may not be publicly available. We anticipate that we, MD Anderson, the NCI and PGEN will file additional patent applications both in the United States and in other countries. However, we cannot predict or guarantee:

- The degree and range of protection any patents will afford us against competitors, including whether third parties will find ways to invalidate or otherwise circumvent our patents;
- If and when patents will be issued;
- Whether or not others will obtain patents claiming subject matter related to or relevant to our product candidates; or
- Whether we will need to initiate litigation or administrative proceedings that may be costly whether we win or lose.

The patent prosecution process is expensive and time-consuming, and we may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost, in a timely manner, or in all jurisdictions. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. Moreover, in some circumstances, we do not have the right to control the preparation, filing and prosecution of patent applications, or to maintain the patents, covering technology that we license from third parties. We may also require the cooperation of our licensors in order to enforce the licensed patent rights, and such cooperation may not be provided. Therefore, these patents and applications may not be prosecuted and enforced in a manner consistent with the best interests of our business.

The patent position of biotechnology and pharmaceutical companies generally is highly uncertain, involves complex legal and factual questions and has in recent years been the subject of much litigation. In addition, the laws of foreign countries may not protect our rights to the same extent as the laws of the United States and we may fail to seek or obtain patent protection in all major markets. For example, European patent law restricts the patentability of methods of treatment of the human body more than United States law does. Publications of discoveries in the scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until 18 months after filing, or in some cases not at all.

Changes in patent laws or in interpretations of patent laws in the United States and other countries may diminish the value of our intellectual property or narrow the scope of our patent protection. In September 2011, the Leahy-Smith America Invents Act, or the Leahy-Smith Act, was signed into law, resulting in a number of significant changes to United States patent law. These changes include provisions that affect the way patent applications are prosecuted and may also affect patent litigation. In addition, the United States Supreme Court has ruled on several patent cases in recent years, either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations. This combination of events has created uncertainty with respect to the value of patents, once obtained, and with regard to our ability to obtain patents in the future. As the USPTO continues to implement the Leahy-Smith Act, and as the federal courts have the opportunity to interpret the Leahy-Smith Act, the laws and regulations governing patents, and the rules regarding patent procurement could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future.

Certain technologies utilized in our research and development programs are already in the public domain. Moreover, a number of our competitors have developed technologies, filed patent applications or obtained patents on technologies, compositions and methods of use that are related to our business and may cover or conflict with our owned or licensed patent applications, technologies or product candidates. Such conflicts could limit the scope of the patents that we may be able to obtain or may result in the rejection of claims in our patent applications. Because patent applications in the United States and many foreign jurisdictions are typically not published until 18 months after filing, or in some cases not at all, and because publications of discoveries in the scientific literature often lag behind actual discoveries, neither we nor our licensors can be certain that others have not filed or maintained patent applications for technology used by us or covered by our pending patent applications without our being aware of these applications. Therefore, we cannot know with certainty whether we were the first to make the inventions claimed in our owned patents or pending patent applications, or that we were the first to file for patent protection of such inventions, nor can we know whether those from whom we license patents were the first to make the inventions claimed or were the first to file. As a result, the issuance, scope, validity,

enforceability and commercial value of our patent rights are highly uncertain. Our pending and future patent applications may not result in patents being issued which protect our technology or products, in whole or in part, or which effectively prevent others from commercializing competitive technologies and products. Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may diminish the value of our patents or narrow the scope of our patent protection. In addition, our own earlier filed patents and applications or those of MD Anderson, NCI or PGEN may limit the scope of later patents we obtain or may result in the rejection of claims in our later filed patent applications. If third parties filed patent applications or obtained patents on technologies, compositions and methods of use that are related to our business and that cover or conflict with our owned or licensed patent applications, technologies or product candidates, we may be required to challenge such protection, terminate or modify our programs impacted by such protection or obtain licenses from such third parties, which might not be available on acceptable terms, or at all.

Even if our owned and licensed patent applications issue as patents, they may not issue in a form that will provide us with any meaningful protection, prevent competitors from competing with us or otherwise provide us with any competitive advantage. Our competitors may be able to circumvent our owned or licensed patents by developing similar or alternative technologies or products in a non-infringing manner.

The issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, and our owned and licensed patents may be challenged in the courts or patent offices in the United States and abroad. Such challenges may result in loss of exclusivity or freedom to operate or in patent claims being narrowed, invalidated or held unenforceable, in whole or in part, which could limit our ability to stop others from using or commercializing similar or identical technology and products, or limit the duration of the patent protection of our technology and products. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours.

If we are unable to protect the confidentiality of our confidential information, our business and competitive position would be harmed.

Our success also depends upon the skills, knowledge, and experience of our scientific and technical personnel, our consultants and advisors, as well as our licensors and contractors. To help protect our proprietary know-how and our inventions for which patents may be unobtainable or difficult to obtain, and to maintain our competitive position, we rely on trade secret protection and confidentiality agreements. To this end, it is our general policy to require our employees, consultants, advisors, and contractors to enter into agreements that prohibit the disclosure of confidential information and, where applicable, require disclosure and assignment to us of the ideas, developments, discoveries, and inventions important to our business. These agreements may not provide adequate protection for our trade secrets, know-how, confidential information or other proprietary information in the event of any unauthorized use or disclosure or the lawful development by others of such information. Moreover, we may not be able to obtain adequate remedies for any breaches of these agreements. Our trade secrets or other confidential information may also be obtained by third parties by other means, such as breaches of our physical or computer security systems. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret or other confidential information is difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, some courts inside and outside the United States are less willing or unwilling to protect trade secrets. If any of our trade secrets or other confidential information were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent them, or those to whom they communicate it, from using that technology or information to compete with us. If any of our trade secrets, know-how or other proprietary information is disclosed, the value of our trade secrets, know-how and other proprietary rights would be significantly impaired and our business and competitive position would suffer.

Third-party claims of intellectual property infringement would require us to spend significant time and money and could prevent us from developing or commercializing our products.

In order to protect or enforce patent rights, we may initiate patent infringement litigation against third parties. Similarly, we may be sued by others for patent infringement. We also may become subject to proceedings conducted in the United States Patent and Trademark Office, including interference proceedings to determine the priority or derivation of inventions, or post-grant review, inter partes review, or reexamination proceedings reviewing the patentability of our patented claims. In addition, any foreign patents that are granted may become subject to opposition, nullity, or revocation proceedings in foreign jurisdictions having such proceedings. The defense and prosecution, if necessary, of intellectual property actions are costly and divert technical and management personnel away from their normal responsibilities.

Our commercial success depends upon our ability, and the ability of our collaborators, to develop, manufacture, market and sell our product candidates without infringing the proprietary rights of third parties. There is considerable intellectual property litigation in the biotechnology and pharmaceutical industries. While no such litigation has been brought against us and we have not been held by any court to have infringed a third party’s intellectual property rights, we cannot guarantee that our products or use of our products do not infringe third-party patents. It is also possible that we have failed to identify relevant third-party patents or applications. For example,

applications filed before November 29, 2000 and certain applications filed after that date that will not be filed outside the United States remain confidential until patents issue. Patent applications in the United States and elsewhere are published approximately 18 months after the earliest filing, which is referred to as the priority date. Therefore, patent applications covering our products or technology could have been filed by others without our knowledge. Additionally, pending patent applications which have been published can, subject to certain limitations, be later amended in a manner that could cover our products or the use of our products.

Our research, development and commercialization activities, as well as any product candidates or products resulting from these activities, may infringe or be claimed to infringe patents or patent applications under which we do not hold licenses or other rights. A patent does not protect its owner from a claim of infringement of another owner's patent. Therefore, our patent position cannot and does not provide any assurance that we are not infringing the patent rights of another.

The patent landscape in the field of immuno-oncology is particularly complex. We are aware of numerous United States and foreign patents and pending patent applications of third parties that cover compositions, methods of use and methods of manufacture of immuno-oncology products. In addition, there may be patents and patent applications in the field of which we are not aware. The technology we license from MD Anderson, NCI and PGEN is early-stage technology and we are in the process of designing and developing products using this technology. Although we will seek to avoid pursuing the development of products that may infringe any patent claims that we believe to be valid and enforceable, we may fail to do so. Moreover, given the breadth and number of claims in patents and pending patent applications in the field of immuno-oncology and the complexities and uncertainties associated with them, third parties may allege that we are infringing patent claims even if we do not believe such claims to be valid and enforceable.

If a claim for patent infringement is asserted, there can be no assurance that the resolution of the claim would permit us to continue marketing the relevant product on commercially reasonable terms, if at all. We may not have sufficient resources to bring these actions to a successful conclusion. If we do not successfully defend any infringement actions to which we become a party or are unable to have infringed patents declared invalid or unenforceable, we may have to pay substantial monetary damages, which can be tripled if the infringement is deemed willful, or we may be required to discontinue or significantly delay commercialization and development of the affected products.

Any legal action against us or our collaborators claiming damages and seeking to enjoin developmental or marketing activities relating to affected products could, in addition to subjecting us to potential liability for damages, require us or our collaborators to obtain licenses to continue to develop, manufacture, or market the affected products. Such a license may not be available to us on commercially reasonable terms, if at all.

An adverse determination in a proceeding involving our owned or licensed intellectual property may allow entry of substitutes, including biosimilar or generic substitutes, for our products.

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 noncompliance with these requirements.

Periodic maintenance fees on any issued patent are due to be paid to the USPTO and foreign patent agencies in several stages over the lifetime of the patent. The USPTO and various foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. While an inadvertent lapse can in many cases be cured by payment of a late fee or by other means in accordance with the applicable rules, there are situations in which noncompliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. Noncompliance events that could result in abandonment or lapse of a patent or patent application include, but are not limited to, failure to respond to official actions within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents. In such an event, our competitors might be able to enter the market, which would have a material adverse effect on our business.

We license rights to products and technology that are important to our business, and we expect to enter into additional licenses in the future. For instance, we have exclusively licensed patents and patent applications under the MD Anderson License and our patent license agreement with the NCI as well as under our License Agreement with PGEN. Under these agreements, we are subject to a range of commercialization and development, sublicensing, royalty, patent prosecution and maintenance, insurance and other obligations.

Any failure by us to comply with any of these obligations or any other breach by us of our license agreements could give the licensor the right to terminate the license in whole, terminate the exclusive nature of the license or bring a claim against us for damages. Any such termination or claim could have a material adverse effect on our financial condition, results of operations, liquidity or business. Even if we contest any such termination or claim and are ultimately successful, such dispute could lead to delays in the development

or commercialization of potential products and result in time-consuming and expensive litigation or arbitration. On termination we may be required to license to the licensor any related intellectual property that we developed.

In addition, in certain cases, the rights licensed to us are rights of a third party licensed to our licensor. In such instances, if our licensors do not comply with their obligations under such licenses, our rights under our license agreements with our licensor may be adversely affected.

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

Many of our employees were previously employed at universities or other biotechnology or pharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that these employees or we have used or disclosed intellectual property, including trade secrets or other proprietary information, of any such employee's former employer. Litigation may be necessary to defend against these claims.

In addition, while it is our policy to require our employees and contractors who may be involved in the development of intellectual property to execute agreements assigning such intellectual property to us, we may be unsuccessful in executing such an agreement with each party who in fact develops intellectual property that we regard as our own. Our and their assignment agreements may not be self-executing or may be breached, and we may be forced to bring claims against third parties, or defend claims they may bring against us, to determine the ownership of what we regard as our intellectual property.

If we fail in prosecuting or defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel. Even if we are successful in prosecuting or defending against such claims, litigation could result in substantial costs and be a distraction to management.

OTHER RISKS RELATED TO OUR COMPANY

Our stock price has been, and may continue to be, volatile.

The market price for our common stock is volatile and may fluctuate significantly in response to a number of factors, most of which we cannot control, including:

- Price and volume fluctuations in the overall stock market;
- Changes in operating results and performance and stock market valuations of other biopharmaceutical companies generally, or those that develop and commercialize cancer drugs in particular;
- Market conditions or trends in our industry or the economy as a whole;
- Preclinical studies or clinical trial results;
- Public concern as to the safety of drugs developed by us or others;
- The financial or operational projections we may provide to the public, any changes in these projections or our failure to meet these projections;
- Comments by securities analysts or changes in financial estimates or ratings by any securities analysts who follow our common stock, our failure to meet these estimates or failure of those analysts to initiate or maintain coverage of our common stock;
- The public's response to press releases or other public announcements by us or third parties, including our filings with the SEC, as well as announcements of the status of development of our products, announcements of technological innovations or new therapeutic products by us or our competitors, announcements regarding collaborative agreements and other announcements relating to product development, litigation and intellectual property impacting us or our business;
- Government regulation;
- FDA determinations on the approval of a product candidate BLA submission;
- The sustainability of an active trading market for our common stock;
- Future sales of our common stock by us, our executive officers, directors and significant stockholders;
- Announcements of mergers or acquisition transactions;

- Our inclusion or deletion from certain stock indices;
- Developments in patent or other proprietary rights;
- Changes in reimbursement policies;
- Announcements of medical innovations or new products by our competitors;
- Announcements of changes in our senior management or directors;
- General economic, industry, political and market conditions, including, but not limited to, the ongoing impact of the COVID 19 pandemic;
- Other events or factors, including those resulting from war, incidents of terrorism, natural disasters or responses to these events; and
- Changes in accounting principles.

In addition, the stock market in general and our stock in particular from time to time experiences significant price and volume fluctuations unrelated to the operating performance of particular companies, including in connection with the ongoing COVID-19 pandemic, which has resulted in decreased stock prices for many companies notwithstanding the lack of a fundamental change in their underlying business models or prospects. Public debt and equity markets, and in particular the Nasdaq Global Select Market, have experienced extreme price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many biopharmaceutical companies.

Stock prices of many biopharmaceutical companies have fluctuated in a manner unrelated or disproportionate to the operating performance of those companies. In the past, stockholders have instituted securities class action litigation following periods of market volatility. If we were involved in securities litigation, we could incur substantial costs and our resources, and the attention of management could be diverted from our business.

Anti-takeover provisions in our charter documents and under Delaware law may make an acquisition of us, which may be beneficial to our stockholders, more difficult.

Provisions of our amended and restated certificate of incorporation and bylaws, as well as provisions of Delaware law, could make it more difficult for a third party to acquire us, even if doing so would benefit our stockholders. These provisions authorize the issuance of “blank check” preferred stock that could be issued by our board of directors to increase the number of outstanding shares and hinder a takeover attempt, and limit who may call a special meeting of stockholders. In addition, Section 203 of the Delaware General Corporation Law generally prohibits a publicly-held Delaware corporation from engaging in a business combination with a party that owns at least 15% of its common stock unless the business combination is approved by the company’s board of directors before the person acquires the 15% ownership stake or later by its board of directors and two-thirds of its stockholders. Section 203 could have the effect of delaying, deferring or preventing a change in control that our stockholders might consider to be in their best interests.

Because we do not expect to pay dividends, you will not realize any income from an investment in our common stock unless and until you sell your shares at profit.

We have never paid dividends on our common stock and we do not anticipate that we will pay any dividends for the foreseeable future. Accordingly, any return on an investment in us will be realized, if at all, only when you sell shares of our common stock.

Our ability to use net operating loss carryforwards and research tax credits to reduce future tax payments may be limited or restricted.

We have generated significant net operating loss carryforwards, or NOLs, and research and development tax credits, or R&D credits, as a result of our incurrence of losses and our conduct of research activities since inception. We generally are able to carry NOLs and R&D credits forward to reduce our tax liability in future years. However, our ability to utilize the NOLs and R&D credits is subject to the rules of Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, or the Code, respectively. Those sections generally restrict the use of NOLs and R&D credits after an “ownership change.” An ownership change occurs if, among other things, the stockholders (or specified groups of stockholders) who own or have owned, directly or indirectly, 5% or more of a corporation’s common stock or are otherwise treated as 5% stockholders under Section 382 of the code and the United States Treasury Department regulations promulgated thereunder increase their aggregate percentage ownership of that corporation’s stock by more than 50 percentage points over the lowest percentage of the stock owned by these stockholders over the applicable testing period. In the event of an ownership change, Section 382 imposes an annual limitation on the amount of taxable income a corporation may offset with NOL carry forwards and Section 383 imposes an annual limitation on the amount of tax a corporation may offset with business credit (including the R&D credit) carry forwards.

We may have experienced an “ownership change” within the meaning of Section 382 in the past and there can be no assurance that we will not experience additional ownership changes in the future. As a result, our NOLs and business credits (including the R&D credit) may be subject to limitations and we may be required to pay taxes earlier and in larger amounts than would be the case if our NOLs or R&D credits were freely usable.

If securities and/or industry analysts fail to continue publishing research about our business, if they change their recommendations adversely or if our results of operations do not meet their expectations, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline. In addition, it is likely that in some future period our operating results will be below the expectations of securities analysts or investors. If one or more of the analysts who cover us downgrade our stock, or if our results of operations do not meet their expectations, our stock price could decline.

Our business could be negatively affected as a result of the actions of activist stockholders.

Recently, we were engaged in a consent solicitation led by WaterMill Asset Management Corp. where two new directors were added to our Board. We could experience other stockholder activism in the future, including another consent solicitation or a proxy contest. Activist shareholders may advocate for certain governance and strategic changes at our company. In the event of stockholder activism, particularly with respect to matters which our Board, in exercising their fiduciary duties, disagree with or have determined not to pursue, our business could be adversely affected because responding to actions by activist stockholders can be costly and time-consuming, disrupting our operations and diverting the attention of management, and perceived uncertainties as to our future direction may result in the loss of potential business opportunities and may make it more difficult to attract and retain qualified personnel, business partners, and customers.

In addition, if faced with a consent solicitation or proxy contest, we may not be able to respond successfully to the contest or dispute, which would be disruptive to our business. If individuals are elected to our Board with a differing agenda, our ability to effectively and timely implement our strategic plan and create additional value for our stockholders may be adversely affected.

****Our principal stockholders, executive officers and directors have substantial control over the company, which may prevent you and other stockholders from influencing significant corporate decisions and may harm the market price of our common stock.***

As of June 30, 2021, our executive officers, directors and holders of five percent or more of our outstanding common stock, beneficially owned, in the aggregate, 51.4% of our outstanding common stock. These stockholders may have interests that conflict with our other stockholders and, if acting together, have the ability to influence the outcome of matters submitted to our stockholders for approval, including the election and removal of directors and any merger, consolidation or sale of all or substantially all of our assets. Accordingly, this concentration of ownership may harm the market price of our common stock by:

- Delaying, deferring or preventing a change in control;
- Impeding a merger, consolidation, takeover or other business combination involving us; or
- Discouraging a potential acquirer from making a tender offer or otherwise attempting to obtain control of us.

In addition, this significant concentration of stock ownership may adversely affect the trading price of our common stock should investors perceive disadvantages in owning shares of common stock in a company that has such concentrated ownership.

The Tax Cuts and Jobs Act, signed into law in 2017 could adversely affect our business and financial condition.

On December 22, 2017, President Trump signed into law legislation, known as the Tax Cuts and Jobs Act of 2017, or Tax Act, that significantly revises the Code. The federal income tax law is referred to as the Tax Act, and contains significant changes to corporate taxation, including reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, limitation of the tax deduction for interest expense to 30% of adjusted earnings (except for certain small businesses), limitation of the deduction for NOLs to 80% of current year taxable income and elimination of NOL carrybacks, one time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, elimination of U.S. tax on foreign earnings (subject to certain important exceptions), immediate deductions for certain new investments instead of deductions for depreciation expense over time, and modifying or repealing many business deductions and credits. The CARES Act, enacted in 2020, modified certain of these tax changes, and enacted other tax changes applicable to corporations. Notwithstanding the reduction in the corporate income tax rate, the overall impact of the

Tax Act and the CARES Act is uncertain and our business and financial condition could be adversely affected. In addition, it is uncertain if and to what extent various states will conform to the Tax Act or the CARES Act. The impact of the Tax Act and the CARES Act on holders of our common stock is also uncertain and could be adverse. We urge our stockholders to consult with their legal and tax advisors with respect to this legislation and the potential tax consequences of investing in or holding our common stock.

RISKS RELATED TO INDEBTEDNESS

We have incurred indebtedness, the funding of which is, in part, dependent on our future performance and our ability to raise additional capital.

On August 6, 2021, we, as borrower, entered into a loan and security agreement with Silicon Valley Bank, as lender, which agreement provides for term loans in an aggregate principal amount of up to $50.0 million, or the SVB Facility. The SVB Facility consists of two tranches of term loans, the first of which was funded on August 6, 2021 and the second of which is conditioned upon achieving certain milestones. Several of those milestones relate to the performance of certain drugs in development, and one milestone relates to the receipt of additional capital. If we do not reach those milestones, we will be unable to draw on the second term loan tranche, thereby reducing our liquidity, and we will be required to make principal payments on the SVB Facility beginning one year earlier than if we were to draw on the second term loan tranche.

We have incurred indebtedness to increase liquidity and servicing our debt will require a significant amount of cash. We may not have sufficient cash flow from our operations to pay our substantial debt.

Our ability to make scheduled payments of the principal of, to pay interest on or to further refinance our indebtedness depends on our future performance, which is subject to economic, financial, competitive and other factors beyond our control as well as our ability to raise additional capital. We may also seek additional debt financing to meet the financing milestone under the SVB Facility and to support our ongoing activities. Debt financing can have significant adverse consequences for our business, including:

- requiring us to dedicate a substantial portion of cash flows from operations to payment on our debt, which would reduce available funds for further research and development;
- increasing the amount of interest that we must pay on debt with variable interest rates, if market rates of interest increase;
- subjecting us to restrictive covenants that reduce our ability to take certain corporate actions, acquire companies, products or technology, or obtain further debt financing;
- requiring us to pledge our non-intellectual property assets as collateral, which could limit our ability to obtain additional debt financing;
- requiring us to cash collateralize a portion of the SVB Facility if we do not raise additional capital prior to the end of the year.

We may not have sufficient funds or be able to obtain additional financing to pay the amounts due under our indebtedness. In addition, failure to comply with the covenants and payment obligations under the SVB Facility could result in an event of default under that agreement. An event of default could result in the acceleration of amounts due under the SVB Facility and a cross default and acceleration under other debt agreements, and we may not have sufficient funds to pay or be able to obtain additional financing to make any accelerated payments. Under these circumstances, our lenders could seek to enforce security interests in our assets securing our indebtedness.

Our current indebtedness restricts and any additional debt financing may restrict the operation of our business and limit the cash available for investment in our business operations.

The SVB Facility includes a $25 million term loan, which was funded on the effective date of the facility, and the ability to borrow an additional $25 million term loan, subject to the achievement of certain milestones. We may also seek additional debt financing to meet the financing milestone under the SVB Facility and to support our ongoing activities. Debt financing can have significant adverse consequences for our business, including:

- the ability to enter into certain licensing arrangements;
- the ability to maintain flexible cash management arrangements;
- the payment obligations under our indebtedness;
- the scope, progress, results and costs of our development activities.

Item 2. Unregistered Sale of Equity Securities and Use of Proceeds

None.

Item 3. Defaults upon Senior Securities

Not applicable.

Item 4. Mine Safety Disclosures

Not applicable.

Item 5. Other Information

None.

Item 6. Exhibits

Exhibit Number	Description
3.1	Amended and Restated Certificate of Incorporation of the Registrant, as filed with the Delaware Secretary of State on April 26, 2006 (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K, SEC File No. 000-32353, filed April 26, 2006).
3.2	Amendment to Amended and Restated Certificate of Incorporation effective as of May 21, 2021 (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K, SEC File No. 001-33038, filed May 21, 2021).
3.3	Amended and Restated Certificate of Designation, Preferences and Rights of Series 1 preferred stock, as filed with the Delaware Secretary of State on July 1, 2016 (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K/A, SEC File No. 001-33038, filed July 1, 2016).
10.1	Separation Agreement by and between the Company and Dr. Laurence Cooper, dated April 5, 2021 (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, SEC File No. 001-33038, filed April 9, 2021)
10.2*	Consulting Agreement between the Company and Dr. Laurence Cooper, dated April 5, 2021 (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, SEC File No. 001-33038, filed April 9, 2021).
31.1+	Certification of Principal Executive Officer pursuant to Exchange Act Rules 13a-14 or 15d-14 under 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 Exchange Act Rules 13a-14 or 15d-14 under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1++	Certifications of Principal Executive Officer and 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+	Inline XBRL Instance Document (the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document).
101.SCH+	Inline XBRL Taxonomy Extension Schema Document
101.CAL+	Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF+	Inline XBRL Taxonomy Definition Linkbase Document
101.LAB+	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE+	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104+	Cover Page Interactive Data File—the cover page interactive data is embedded within the Inline XBRL document or included within the Exhibit 101 attachments

\+ Filed herewith.

++ This certification is deemed not filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or otherwise subject to the liability of that section, nor shall it be deemed incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date hereof, regardless of any general incorporation language in such filing.

* Indicates a management contract or compensatory plan.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

ZIOPHARM ONCOLOGY, INC.

By:

/s/ Heidi Hagen

Heidi Hagen
Interim Chief Executive Officer
(On Behalf of the Registrant and as Principal Executive Officer)
Dated: August 13, 2021

By:

/s/ Timothy Cunningham

Timothy Cunningham
Interim Chief Financial Officer
(Principal Financial Officer)
Dated: August 13, 2021

Exhibit 31.1

CERTIFICATION

I, Heidi Hagen, certify that:

1. I have reviewed this quarterly report on Form 10-Q of ZIOPHARM Oncology, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 13, 2021

/s/ Heidi Hagen

Heidi Hagen
Interim Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION

I, Timothy Cunningham, certify that:

1. I have reviewed this quarterly report on Form 10-Q of ZIOPHARM Oncology, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 13, 2021

/s/ Timothy Cunningham

Timothy Cunningham
Interim Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION

In connection with the Quarterly Report on Form 10-Q of ZIOPHARM Oncology, Inc. (the "Company") for the quarter ended June 30, 2021, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), we Heidi Hagen, the Interim Principal Executive Officer of the Company and Timothy Cunningham, the Interim Principal Financial Officer of the Company, each hereby each certifies, pursuant to 18 U.S.C. 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to the best of his or her knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d), as applicable, 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.

Dated: August 13, 2021

/s/ Heidi Hagen

Heidi Hagen
Interim Chief Executive Officer
(Principal Executive Officer)

/s/ Timothy Cunningham

Timothy Cunningham
Interim Chief Financial Officer
(Principal Financial Officer)