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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**

For the transition period from to

Commission File Number: 001-38586

RUBIUS THERAPEUTICS, INC.

(Exact name of registrant as specified in its charter)

Delaware	**46-2688109**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
399 Binney Street, Suite 300 Cambridge, Massachusetts	**02139**
(Address of principal executive offices)	(Zip code)

(617) 679-9600

(Registrant's telephone number, including area code)

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

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

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

Indicate by check mark 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 30, 2021, the registrant had 89,773,882 shares of common stock, $0.001 par value per share, outstanding.

FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q contains forward-looking statements, which reflect our current views with respect to, among other things, our operations and financial performance. All statements other than statements of historical facts contained in this Quarterly Report on Form 10-Q, including statements regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plan, objectives of management, results of preclinical studies or clinical trials and expected market growth are forward-looking statements. You can identify these forward-looking statements by the use of words such as “outlook,” “believes,” “expects,” “potential,” “continues,” “may,” “will,” “should,” “seeks,” “approximately,” “predicts,” “intends,” “plans,” “estimates,” “anticipates” or the negative version of these words or other comparable words. Such forward-looking statements are subject to various risks and uncertainties. Accordingly, there are or will be important factors that could cause actual outcomes or results to differ materially from those indicated in these statements. We believe these factors include but are not limited to those described under “Risk Factors” including, among other things:

- the success, cost and timing of our product development activities and clinical trials, including the timing of initiation, enrollment in and completion of studies or trials and related preparatory work, availability and timing of clinical trial results, and the success and cost of our research and development programs;
- our ability to advance any product candidate into or successfully complete any clinical trial;
- our ability or the potential to successfully manufacture our product candidates or obtain adequate and timely supply of our product candidates for clinical trials or for commercial use, if approved;
- our ability to successfully operate our manufacturing facility and any plans for further renovation or expansion;
- the potential for our identified research priorities to advance our technologies;
- our ability to obtain regulatory approval, or to maintain such regulatory approval if obtained, of any of our current or future product candidates, and any related restrictions, limitations and/or warnings in the label of an approved product candidate;
- the ability to license additional intellectual property relating to our product candidates and to comply with our existing license agreements;
- our ability to commercialize our products in light of the intellectual property rights of others;
- developments relating to cellular therapies, including red blood cell therapies;
- the success of competing therapies that are or become available;
- our ability to obtain funding for our operations, including funding necessary to complete further development, clinical trials and, if approved, commercialization of our product candidates;
- the commercialization of our product candidates, if approved;
- our plans to research, develop and commercialize our product candidates;
- our ability to attract collaborators with development, regulatory and commercialization expertise;
- future agreements with third parties in connection with the commercialization of our product candidates and any other approved product;
- the size and growth potential of the markets for our product candidates, and our ability to serve those markets;

- the impact of global economic and political developments on our business and on our clinical trials, including economic slowdowns or recessions that have resulted from the ongoing outbreak of COVID-19;
- natural and manmade disasters, including pandemics such as COVID-19, and other force majeures, which could impact our operations, and those of our partners and other participants in the health care industry, and which could reduce demand for, or inhibit our ability to develop and manufacture, our product candidates;
- the rate and degree of market acceptance of our product candidates;
- regulatory developments in the United States and foreign countries;
- our ability to contract with third-party suppliers and manufacturers and their ability to perform adequately;
- our ability to attract and retain key scientific or management personnel;
- the accuracy of our estimates regarding expenses, future revenue, capital requirements and needs for additional financing;
- the impact of laws and regulations and legislative and regulatory changes;
- our expectations regarding our ability to obtain and maintain intellectual property protection for our product candidates; and

All of our forward-looking statements are as of the date of this Quarterly Report on Form 10-Q only. In each case, actual results may differ materially from such forward-looking information. We can give no assurance that such expectations or forward-looking statements will prove to be correct. An occurrence of or any material adverse change in one or more of the risk factors or risks and uncertainties referred to in this Quarterly Report on Form 10-Q or included in our other public disclosures or our other periodic reports or other documents or filings filed with or furnished to the Securities and Exchange Commission, or the SEC, could materially and adversely affect our business, prospects, financial condition and results of operations. Except as required by law, we do not undertake or plan to update or revise any such forward-looking statements to reflect actual results, changes in plans, assumptions, estimates or projections or other circumstances affecting such forward-looking statements occurring after the date of this Quarterly Report on Form 10-Q, even if such results, changes or circumstances make it clear that any forward-looking information will not be realized. Any public statements or disclosures by us following this Quarterly Report on Form 10-Q that modify or impact any of the forward-looking statements contained in this Quarterly Report on Form 10-Q will be deemed to modify or supersede such statements in this Quarterly Report on Form 10-Q.

Summary of the Material Risks Associated with Our Business

Our business is subject to numerous risks and uncertainties that you should be aware of in evaluating our business. These risks include, but are not limited to, the following:

- we have incurred net losses in every year since our inception and anticipate that we will continue to incur net losses in the future;
- we will require additional capital to fund our operations and if we fail to obtain necessary financing, we will not be able to complete the development and commercialization of our product candidates;
- we have a limited operating history, which may make it difficult to evaluate our technology and product development capabilities and predict our future performance;
- our business is highly dependent on the success of our initial product candidates targeting cancer and autoimmune diseases. All of our product candidates will require significant additional nonclinical and clinical development before we can seek regulatory approval for and launch a product commercially;
- the successful development of cellular therapeutics, such as our investigational Red Cell Therapeutics, or RCTs, is highly uncertain;
- our RCT product candidates are based on a new technology, which makes it difficult to predict the time and cost of development and of subsequently obtaining regulatory approval, if at all;
- the FDA, the EMA and other regulatory authorities may implement additional regulations or restrictions on the development and commercialization of our product candidates, which may be difficult to predict;
- clinical development involves a lengthy and expensive process, with an uncertain outcome. We may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of any product candidates;
- our ongoing and planned clinical trials or those of our future collaborators may reveal significant adverse events not seen in our preclinical or nonclinical studies and may result in a safety profile that could inhibit regulatory approval or market acceptance of any of our product candidates;
- positive results from early preclinical studies or early clinical trials of our product candidates are not necessarily predictive of the results of later preclinical studies or any future clinical trials of our product candidates;
- if we encounter difficulties enrolling patients in our clinical trials, our clinical development activities could be delayed or otherwise adversely affected;
- cellular therapies are a novel approach and negative perception of any product candidates that we develop could adversely affect our ability to conduct our business or obtain regulatory approvals for such product candidates;
- we are subject to numerous laws and regulations, noncompliance with which would subject us to possible legal or regulatory action;
- the effects of health epidemics like the recent and ongoing COVID-19 pandemic, including recurring surges and waves of infection and emergent variants of the coronavirus, in regions where we, or the third parties on which we rely, have business operations could continue to adversely impact our business, including our clinical supply, preclinical studies, ongoing and planned clinical trials;

- if we are unable to obtain and maintain patent protection for any product candidates we develop or for our RED PLATFORM, our competitors could develop and commercialize products or technology similar or identical to ours, and our ability to successfully commercialize any product candidates we may develop, and our technology may be adversely affected;

- we intend to rely on patent rights and the status of our product candidates, if approved, as products eligible for exclusivity under the Biologics Price Competition and Innovation Act, or BPCIA. If we are unable to obtain or maintain exclusivity from the combination of these approaches, we may not be able to compete effectively in our markets;

- third-party claims of intellectual property infringement, misappropriation or other violation against us, our licensors or our collaborators may prevent or delay the development and commercialization of our product candidates, RED PLATFORM and other technologies;

- our product candidates are uniquely manufactured. If we or any third-party manufacturers that we may engage encounter difficulties in manufacturing our product candidates, our ability to provide supply of our product candidates for clinical trials or our products for patients, if approved, could be delayed or stopped, or we may be unable to maintain a commercially viable cost structure;

- we have acquired and are establishing our own manufacturing facility and infrastructure in addition to or in lieu of relying on CMOs for the manufacture of our product candidates, which is costly, time-consuming, and which may not be successful; and

- we do not have extensive experience as a company managing a manufacturing facility.

The summary risk factors described above should be read together with the text of the full risk factors below and in the other information set forth in this Quarterly Report on Form 10-Q, including our condensed consolidated financial statements and the related notes, as well as in other documents that we file with the SEC. If any such risks and uncertainties actually occur, our business, prospects, financial condition and results of operations could be materially and adversely affected. The risks summarized above or described in full below are not the only risks that we face. Additional risks and uncertainties not currently known to us, or that we currently deem to be immaterial may also materially adversely affect our business, prospects, financial condition and results of operations.

Rubius Therapeutics, Inc.
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Solely for convenience, the trademarks, service marks and trade names referred to in this quarterly report are listed without the ®, (sm) and ™ symbols, but we will assert, to the fullest extent under applicable law, our rights or the rights of the applicable licensors to these trademarks, service marks and trade names.

PART I—FINANCIAL INFORMATION

Item 1. Condensed Consolidated Financial Statements (Unaudited)

RUBIUS THERAPEUTICS, INC.
CONDENSED CONSOLIDATED BALANCE SHEETS
(In thousands, except share and per share amounts)
(Unaudited)

	June 30, 2021	December 31, 2020
Assets		
Current assets:		
Cash and cash equivalents	$ 283,233	$ 91,165
Investments	15,009	85,122
Prepaid expenses and other current assets	6,046	5,224
Total current assets	304,288	181,511
Operating lease, right-of-use-asset	37,723	40,447
Property, plant and equipment, net	52,500	53,952
Restricted cash	1,573	1,573
Other assets	—	311
Total assets	$ 396,084	$ 277,794
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 5,181	$ 5,478
Accrued expenses and other current liabilities	11,082	13,417
Operating lease liabilities	8,837	8,945
Total current liabilities	25,100	27,840
Long-term debt, net of discount and current portion	75,700	74,944
Other long-term liabilities	620	688
Operating lease liabilities, net of current portion	30,550	32,762
Total liabilities	131,970	136,234
Commitments and contingencies (see Note 9)		
Stockholders' equity:		
Preferred stock, $0.001 par value; 10,000,000 shares authorized at June 30, 2021 and December 31, 2020; no shares issued or outstanding at June 30, 2021 and December 31, 2020	—	—
Common stock, $0.001 par value; 150,000,000 shares authorized at June 30, 2021 and December 31, 2020; 89,719,927 and 81,053,651 shares issued and outstanding at June 30, 2021 and December 31, 2020, respectively	90	81
Additional paid-in capital	837,004	621,946
Accumulated other comprehensive income	1	4
Accumulated deficit	(572,981)	(480,471)
Total stockholders' equity	264,114	141,560
Total liabilities and stockholders' equity	$ 396,084	$ 277,794

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

RUBIUS THERAPEUTICS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS
(In thousands, except share and per share amounts)
(Unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2021	2020	2021	2020
Revenue	$ —	$ —	$ —	$ —
Operating expenses:				
Research and development	36,072	26,096	63,749	62,282
General and administrative	13,851	11,601	27,091	24,265
Total operating expenses	49,923	37,697	90,840	86,547
Loss from operations	(49,923)	(37,697)	(90,840)	(86,547)
Other income (expense):				
Interest income	26	410	52	1,459
Interest expense	(1,312)	(828)	(3,060)	(1,813)
Other income, net	1,029	261	1,338	561
Total other income (expense), net	(257)	(157)	(1,670)	207
Net loss	(50,180)	(37,854)	(92,510)	(86,340)
Net loss per share, basic and diluted	$ (0.56)	$ (0.47)	$ (1.08)	$ (1.07)
Weighted average common shares outstanding, basic and diluted	89,517,784	80,481,756	85,936,079	80,376,830
Comprehensive loss:				
Net loss	$ (50,180)	$ (37,854)	$ (92,510)	$ (86,340)
Other comprehensive income (loss):				
Unrealized gains (losses) on investments, net of tax of $0	(6)	(337)	(3)	119
Comprehensive loss	$ (50,186)	$ (38,191)	$ (92,513)	$ (86,221)

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

RUBIUS THERAPEUTICS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)
(Unaudited)

	Six months ended June 30,	
	2021	2020
Cash flows from operating activities:		
Net loss	$ (92,510)	$ (86,340)
Adjustments to reconcile net loss to net cash used in operating activities:		
Stock-based compensation expense	18,239	16,740
Depreciation and amortization expense	3,012	3,565
Amortization (accretion) of premium (discount) on investments	110	97
Non-cash interest expense	807	145
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	(821)	(2,414)
Operating lease, right-of-use-asset	2,729	2,868
Accounts payable	(171)	3,084
Accrued expenses and other current liabilities	(2,466)	(4,261)
Other long-term liabilities	(68)	293
Operating lease liabilities	(2,320)	(2,344)
Net cash used in operating activities	(73,459)	(68,567)
Cash flows from investing activities:		
Purchases of property, plant and equipment	(1,591)	(3,946)
Purchases of investments	—	(57,465)
Sales and maturities of investments	70,000	141,502
Net cash provided by investing activities	68,409	80,091
Cash flows from financing activities:		
Proceeds from underwritten public offering of common stock, net of commissions and underwriting discounts	188,000	—
Payments of offering costs	(360)	—
Payments of debt issuance costs	(150)	—
Proceeds from borrowings under loan and security agreement	—	25,000
Proceeds from issuance of common stock upon exercise of stock options	9,628	742
Net cash provided by financing activities	197,118	25,742
Net increase in cash, cash equivalents and restricted cash	192,068	37,266
Cash, cash equivalents and restricted cash at beginning of period	92,901	93,633
Cash, cash equivalents and restricted cash at end of period	$ 284,969	$ 130,899
Supplemental cash flow information:		
Cash paid for interest	$ 1,917	$ 1,655
Cash paid for leases	$ 3,806	$ 4,004
Supplemental disclosure of non-cash investing and financing information:		
Purchases of property, plant and equipment included in accounts payable or accrued expenses	$ 288	$ 556
Offering costs included in accounts payable and accrued expenses	$ 35	$ —
Lease asset derecognized upon lease cancellation	$ —	$ 982

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

RUBIUS THERAPEUTICS, INC.
CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In thousands, except share amounts)
(Unaudited)

	Common stock		Additional paid-in capital	Accumulated other comprehensive income	Accumulated deficit	Total stockholders' equity
	Shares	Amount				
Balances at December 31, 2020	81,053,651	$ 81	$ 621,946	$ 4	$ (480,471)	$ 141,560
Issuance of common stock from public offering, net of commissions, underwriting discounts and offering costs of $800	6,896,552	7	187,193	—	—	187,200
Issuance of common stock upon exercise of stock options	1,237,324	1	5,907	—	—	5,908
Stock-based compensation expense	—	—	8,642	—	—	8,642
Unrealized gains on investments	—	—	—	3	—	3
Net loss	—	—	—	—	(42,330)	(42,330)
Balances at March 31, 2021	89,187,527	$ 89	$ 823,688	$ 7	$ (522,801)	$ 300,983
Issuance of common stock upon exercise of stock options	532,400	1	3,719	—	—	3,720
Stock-based compensation expense	—	—	9,597	—	—	9,597
Unrealized losses on investments	—	—	—	(6)	—	(6)
Net loss	—	—	—	—	(50,180)	(50,180)
Balances at June 30, 2021	89,719,927	$ 90	$ 837,004	$ 1	$ (572,981)	$ 264,114

	Common stock		Additional paid-in capital	Accumulated other comprehensive income	Accumulated deficit	Total stockholders' equity
	Shares	Amount				
Balances at December 31, 2019	80,016,245	$ 80	$ 586,798	$ 75	$ (312,740)	$ 274,213
Issuance of common stock upon exercise of stock options	413,721	—	486	—	—	486
Stock-based compensation expense	—	—	8,488	—	—	8,488
Unrealized gains on investments	—	—	—	456	—	456
Net loss	—	—	—	—	(48,486)	(48,486)
Balances at March 31, 2020	80,429,966	80	595,772	531	(361,226)	235,157
Issuance of common stock upon exercise of stock options	115,553	—	256	—	—	256
Stock-based compensation expense	—	—	8,252	—	—	8,252
Unrealized losses on investments	—	—	—	(337)	—	(337)
Net loss	—	—	—	—	(37,854)	(37,854)
Balances at June 30, 2020	80,545,519	$ 80	$ 604,280	$ 194	$ (399,080)	$ 205,474

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

RUBIUS THERAPEUTICS, INC.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

1. Nature of the Business and Basis of Presentation

Rubius Therapeutics, Inc. ("Rubius" or the "Company") is a biopharmaceutical company that is using its platform to genetically engineer red blood cells into medicines, called Red Cell Therapeutics, for the treatment of cancer and autoimmune diseases. Rubius was incorporated in April 2013 as VL26, Inc. under the laws of the State of Delaware. In January 2015, the Company changed its name to Rubius Therapeutics, Inc.

The Company is subject to risks and uncertainties common to early-stage companies in the biotechnology industry, including, but not limited to, development by competitors of new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with government regulations, the ability to establish clinical- and commercial-scale manufacturing processes and the ability to secure additional capital to fund operations. In addition, the Company is subject to uncertainty regarding the performance and safety of its product candidates in humans. Product candidates currently under development will require significant additional research and development efforts, including extensive preclinical and clinical testing and regulatory approval prior to commercialization. These efforts require significant amounts of additional capital, adequate personnel and infrastructure and extensive compliance-reporting capabilities. Even if the Company's drug development efforts are successful, it is uncertain when, if ever, the Company will realize significant revenue from product sales.

The Company is continuing to monitor the impact of the novel coronavirus ("COVID-19"), if any, on the carrying value of certain assets. Although the Company has experienced some impacts to its business as a result of COVID-19, such impacts, to date, have not been material, nor has the Company incurred impairment of any assets as a result of COVID-19. The extent to which these events have impacted, and may continue to impact, the Company's business will depend on future developments, which are highly uncertain and cannot be predicted at this time. The duration and intensity of these impacts and resulting disruption to the Company's operations is uncertain and the Company will continue to assess the financial impact.

On July 20, 2018, the Company completed its initial public offering ("IPO"), pursuant to which it issued and sold 12,055,450 shares of common stock, inclusive of 1,572,450 shares sold by the Company pursuant to the full exercise of the underwriters' option to purchase additional shares. The aggregate net proceeds received by the Company from the IPO were $254.3 million, after deducting underwriting discounts and commissions and other offering costs. Upon the closing of the IPO, all of the shares of the Company's outstanding convertible preferred stock then outstanding automatically converted into 51,845,438 shares of common stock.

On March 18, 2021, the Company completed an underwritten public offering (the "March 2021 Offering"), pursuant to which it issued and sold 6,896,552 shares of common stock. The aggregate net proceeds received by the Company from the March 2021 Offering were $187.2 million, after deducting underwriting discounts and commissions and other offering costs.

The accompanying condensed consolidated financial statements have been prepared on the basis of continuity of operations, realization of assets and the satisfaction of liabilities and commitments in the ordinary course of business. The Company has incurred recurring losses since inception, including net losses of $92.5 million for the six months ended June 30, 2021 and $167.7 million for the year ended December 31, 2020. As of June 30, 2021, the Company had an accumulated deficit of $573.0 million. The Company expects to continue to generate operating losses in the foreseeable future. As of August 9, 2021, the issuance date of the interim condensed consolidated financial statements, the Company expects that its cash, cash equivalents and investments will be sufficient to fund its operating expenses, capital expenditure requirements and debt service payments for at least 12 months from the issuance date of the interim condensed consolidated financial statements.

The Company has financed its operations to date primarily through private placements, proceeds from its IPO and the March 2021 Offering and borrowings under credit facilities. The Company has devoted substantially all of its financial

resources and efforts to research and development, including preclinical studies and clinical trials, and developing manufacturing capabilities. The Company will need to raise additional funds through public or private equity financings, debt financings, collaborations, strategic alliances or marketing, distribution or licensing arrangements to fund operations. The Company may not be able to obtain financing, or enter into collaboration or other arrangements, on acceptable terms, or at all. Furthermore, the terms of any financing may adversely affect the holdings or the rights of the Company's stockholders. If the Company is unable to obtain funding, the Company may need to delay, scale back or discontinue some or all of its research and development programs, product portfolio expansion or commercialization efforts, which could adversely affect its business prospects.

The Company’s condensed consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America (“GAAP”).

The accompanying condensed consolidated financial statements include the accounts of the Company and its wholly owned subsidiary. All intercompany accounts and transactions have been eliminated in consolidation. Certain prior period amounts have been reclassified to conform to the current year presentation.

2. Summary of Significant Accounting Policies

Unaudited Interim Financial Information

The condensed consolidated balance sheet at December 31, 2020 was derived from audited financial statements but does not include all disclosures required by GAAP. The accompanying unaudited condensed consolidated financial statements as of June 30, 2021 and for the three and six months ended June 30, 2021 and 2020 have been prepared by the Company pursuant to the rules and regulations of the Securities and Exchange Commission (“SEC”) for interim financial statements. Certain information and footnote disclosures normally included in the financial statements prepared in accordance with GAAP have been condensed or omitted pursuant to such rules and regulations. These condensed consolidated financial statements should be read in conjunction with the Company’s audited consolidated 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 year-ended December 31, 2020, on file with the SEC. In the opinion of management, all adjustments, consisting only of normal recurring adjustments necessary for a fair statement of the Company’s condensed consolidated financial position as of June 30, 2021 and condensed consolidated results of operations for the three and six months ended June 30, 2021 and 2020 and the condensed consolidated cash flows for the six months ended June 30, 2021 and 2020 have been made. The Company’s condensed consolidated results of operations for the three and six months ended June 30, 2021 are not necessarily indicative of the results of operations that may be expected for the year ending December 31, 2021.

Use of Estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting periods. In the condensed consolidated financial statements, the Company uses estimates and assumptions related to the accrual of research and development expenses and the valuation of stock-based awards. The Company bases its estimates on historical experience, known trends and other market-specific or other relevant factors that it believes to be reasonable under the circumstances. On an ongoing basis, management evaluates its estimates as there are changes in circumstances, facts and experience.

The full extent to which the COVID-19 pandemic will directly or indirectly impact the Company’s business, results of operations and financial condition, including clinical trials, research and development costs and employee-related amounts, will depend on future developments that are highly uncertain, including as a result of new information that may emerge concerning COVID-19 and the actions taken to contain or treat COVID-19. As of the date of issuance of these unaudited condensed consolidated financial statements, the Company is not aware of any specific event or circumstance that would require the Company to update estimates, judgments or revise the carrying value of any assets or liabilities. Actual results may differ from those estimates or assumptions.

Concentrations of Credit Risk and of Significant Suppliers

Financial instruments that potentially expose the Company to concentrations of credit risk consist primarily of cash, cash equivalents and investments. The Company's cash, cash equivalents and investments, as of June 30, 2021, consisted of U.S. government money market funds, U.S. government treasury bills and U.S. government treasury notes. The Company does not believe that it is subject to unusual credit risk beyond the normal credit risk associated with commercial banking relationships.

The Company relies, and expects to continue to rely, on a small number of vendors to manufacture supplies and raw materials for its development programs. These programs could be adversely affected by a significant interruption in these manufacturing services or the availability of raw materials.

Cash Equivalents

The Company considers all highly liquid investments with original maturities of three months or less at the date of purchase to be cash equivalents.

Restricted Cash

As of both June 30, 2021 and December 31, 2020, the Company maintained letters of credit totaling $1.7 million for the benefit of the landlords of its leased properties. The Company was required to maintain separate cash balances of these amounts to secure the letters of credit. Related to these separate cash balances, the Company included $0.1 million in prepaid expenses and other current assets and $1.6 million in restricted cash (non-current) in its condensed consolidated balance sheet as of June 30, 2021 and December 31, 2020.

Cash, cash equivalents and restricted cash presented in the accompanying condensed consolidated statement of cash flows was $285.0 million and $130.9 million for the six months ended June 30, 2021 and 2020, respectively, of which $1.7 million and $1.7 million was restricted cash, respectively.

Fair Value Measurements

Certain assets and liabilities are carried at fair value under GAAP. 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. Financial assets and liabilities carried at fair value are to be classified and disclosed in one of the following three levels of the fair value hierarchy, of which the first two are considered observable and the last is considered unobservable:

- Level 1—Quoted prices in active markets for identical assets or liabilities.
- Level 2—Observable inputs (other than Level 1 quoted prices), such as quoted prices in active markets for similar assets or liabilities, quoted prices in markets that are not active for identical or similar assets or liabilities, or other inputs that are observable or can be corroborated by observable market data.
- Level 3—Unobservable inputs that are supported by little or no market activity and that are significant to determining the fair value of the assets or liabilities, including pricing models, discounted cash flow methodologies and similar techniques.

The Company's cash equivalents and investments are carried at fair value, determined according to the fair value hierarchy described above (see Note 3). The carrying values of the Company's accounts payable and accrued expenses approximate their fair values due to the short-term nature of these liabilities. The carrying value of the Company's long-term debt approximates its fair value due to its variable interest rate, which approximates a market interest rate.

Investments

The Company's investments are classified as available-for-sale and are carried at fair value. Realized gains and losses and declines in value are based on the specific identification method and are included as a component of other income (expense), net in the condensed consolidated statements of operations and comprehensive loss. The Company classifies its investments with maturities beyond one year as short-term, based on their highly liquid nature and because such investments are available for current operations.

In June 2016, the Financial Accounting Standards Board (the "FASB") issued Accounting Standards Update ("ASU") No. 2016-13, *Financial Instruments - Credit Losses (Topic 326), Measurement of Credit Losses*, which changes the impairment model for most financial assets, including the Company's investments. The Company adopted the standard effective January 1, 2020 using a prospective transition method.

The Company evaluates its investments with unrealized losses for impairment. When assessing investments for unrealized declines in value, the Company considers whether the decline in value is related to a credit loss or non-credit loss. For credit losses, the Company reduces the investment to fair value through an allowance for credit losses recorded to the balance sheet and corresponding charge to the statement of operations. The allowance for credit losses and corresponding impairment charge is adjusted each period for changes in fair value. For non-credit losses, the Company reduces the investment to fair value through a charge to the statement of comprehensive loss, reported as a component of accumulated other comprehensive income (loss) in stockholders' equity. No such credit losses were recorded during the periods presented.

Leases

At the inception of an arrangement as lessee or lessor, the Company determines whether the arrangement is or contains a lease. Operating lease cost is recognized over the lease term on a straight-line basis. Variable lease cost and short-term leases (lease terms less than 12 months) are recognized as incurred. For both lessee and lessor arrangements, variable lease payments are the amounts owed by the Company to a lessor that are not fixed, such as reimbursement for common area maintenance and utilities costs, and are expensed when incurred. When determining the lease term, the Company includes options to extend or terminate the lease when it is reasonably certain that it will exercise that option.

For lessee arrangements, operating lease liabilities and their corresponding right-of-use assets are recorded based on the present value of lease payments over the expected lease term. The interest rate implicit in lease contracts is typically not readily determinable. As such, the Company utilizes its incremental borrowing rate, which is the rate incurred to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment. Certain adjustments to the right-of-use asset may be required for items such as initial direct costs paid or incentives received. Operating leases are recognized on the balance sheet as right-of-use assets, operating lease liabilities current and operating lease liabilities non-current.

The Company has elected the following lease policies at the inception of a lease: (1) for lessee and lessor arrangements within all asset classes, combine lease and non-lease components as a single component, with the lease expense recognized over the expected term on a straight-line basis and (2) for lessee arrangements, apply short-term lease exemption for all leases that qualify, where a right-of-use asset or lease liability will not be recognized for leases with terms of one year or less.

Recently Adopted Accounting Pronouncements

ASU No. 2019-12, Simplifying the Accounting for Income Taxes

In December 2019, the FASB issued ASU 2019-12, *Simplifying the Accounting for Income Taxes (ASC 740).* The ASU enhances and simplifies various aspects of the income tax accounting guidance in ASC 740, including requirements related to hybrid tax regimes, the tax basis step-up in goodwill obtained in a transaction that is not a business combination, separate financial statements of entities not subject to tax, the intra-period tax allocation exception to the incremental approach, ownership changes in investments, changes from a subsidiary to an equity method investment,

interim-period accounting for enacted changes in tax law, and the year-to-date loss limitation in interim-period tax accounting. This guidance is effective for the Company for annual and interim periods beginning after December 31, 2020; however, early adoption is permitted. The Company adopted this standard as of January 1, 2021 on a prospective basis. The adoption did not have an impact on the Company's condensed consolidated financial statements.

3. Investments and Fair Value of Financial Assets and Liabilities

Investments by security type consisted of the following (in thousands):

	June 30, 2021				
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Credit Losses	Fair Value
U.S. treasury bills and notes (due within one year)	$ 15,008	$ 1	$ —	$ —	$ 15,009
	$ 15,008	$ 1	$ —	$ —	$ 15,009

	December 31, 2020				
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Credit Losses	Fair Value
U.S. treasury bills and notes (due within one year)	$ 85,118	$ 6	$ (2)	$ —	$ 85,122
	$ 85,118	$ 6	$ (2)	$ —	$ 85,122

The following tables present the Company's fair value hierarchy for its assets and liabilities, which are measured at fair value on a recurring basis (in thousands):

	Fair value measurements at June 30, 2021 using:			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents:				
U.S. money market funds	$ 272,987	$ —	$ —	$ 272,987
Investments:				
U.S. treasury bills and notes	—	15,009	—	15,009
	$ 272,987	$ 15,009	$ —	$ 287,996

	Fair value measurements at December 31, 2020 using:			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents:				
U.S money market funds	$ 88,814	$ —	$ —	$ 88,814
Investments:				
U.S. treasury bills and notes	—	85,122	—	85,122
	$ 88,814	$ 85,122	$ —	$ 173,936

U.S. government money market funds were valued by the Company based on quoted market prices, which represent a Level 1 measurement within the fair value hierarchy. U.S. treasury notes and U.S. government agency bonds were valued by the Company using quoted prices in active markets for similar securities, which represent a Level 2 measurement within the fair value hierarchy. There have been no changes to the valuation methods during the six months ended June 30, 2021. The Company evaluates transfers between levels at the end of each reporting period. There were no transfers between Level 1, Level 2 or Level 3 during the six months ended June 30, 2021.

4. Property, Plant and Equipment, Net

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

	June 30, 2021	December 31, 2020
Land	$ 1,300	$ 1,300
Manufacturing facility	31,024	30,969
Manufacturing equipment	8,773	8,782
Laboratory equipment	17,283	16,639
Computer equipment	2,288	2,118
Furniture and fixtures	1,228	1,228
Leasehold improvements	444	444
Construction-in-progress	3,305	2,605
	65,645	64,085
Less: Accumulated depreciation and amortization	(13,145)	(10,133)
	$ 52,500	$ 53,952

5. Accrued Expenses and Other Current Liabilities

Accrued expenses and other current liabilities consisted of the following (in thousands):

	June 30, 2021	December 31, 2020
Accrued employee compensation and benefits	$ 4,840	$ 8,124
Accrued external research and development expenses	3,555	3,156
Accrued manufacturing facility expenses	658	339
Accrued general and administrative expenses	1,322	1,244
Other	707	554
	$ 11,082	$ 13,417

6. Debt

On December 21, 2018 (the “Closing Date”), the Company entered into a loan and security agreement (the “Loan Agreement”) with Solar Capital Ltd., now SLR Investment Corp., as collateral agent for the lenders party thereto for an aggregate principal amount of $75.0 million. The aggregate principal amount was funded in three tranches of term loans of $25.0 million each. On the Closing Date, the Company made an initial borrowing of $25.0 million. In June 2019, the Company made a second borrowing of $25.0 million and in June 2020, the Company made a third and final borrowing of $25.0 million.

On June 22, 2021 (the “Amendment Closing Date”), the Company entered into an amendment (the “Amendment”) to its Loan Agreement. Pursuant to the Amendment, the Company and its lenders agreed to extend the interest-only period applicable to borrowings under the Loan Agreement from December 21, 2021 until July 1, 2024 and the final maturity date from December 21, 2023 until June 1, 2026. An additional tranche in the amount of $35.0 million is available at the request of the Company prior to the final maturity date, to be provided at the sole discretion of the lenders. The Amendment increases the LIBOR interest rate floor from 0.00% to 2.10%. Interest on the outstanding loan balance will accrue at a rate of 5.50%, plus the greater of 2.10% or the one-month U.S. LIBOR rate. Certain back-end fees are due to the lender at the time of final repayment based on the total funded term loans. The Company accrues the back-end fees that will be due at final repayment to outstanding debt by charges to interest expense over the term of the loans using the effective interest method. The term loans are subject to a prepayment fee of 1.00% if prepayment occurs within the first year subsequent to the Amendment Closing Date, 0.50% in the second year and 0.25% in the third year through final maturity date.

As the terms of the Amendment were not substantially different than the terms of the Loan Agreement, the Amendment was accounted for as a debt modification. In conjunction with the Amendment, the Company incurred issuance costs of $0.2 million payable to the lenders, which were recorded as an additional debt discount and will be amortized to interest expense over the remaining term, together with unamortized original issuance costs as of the Amendment Closing Date, using the effective interest method.

The Loan Agreement contains financial covenants that require the Company to maintain either a certain minimum cash balance or a minimum market capitalization threshold. The Company was in compliance with all such financial covenants as of June 30, 2021. The Loan Agreement contains customary representations, warranties and covenants and also includes customary events of default, including payment defaults, breaches of covenants, change of control and a material adverse change default. Upon the occurrence of an event of default, a default interest rate of an additional 4.00% per annum may be applied to the outstanding loan balances, and the lenders may declare all outstanding obligations immediately due and payable. Borrowings under the Loan Agreement are collateralized by substantially all of the Company's assets, other than its intellectual property.

As of June 30, 2021, the estimated future principal payments due were as follows (in thousands):

Year ending December 31,	
2021 (six months ending December 31)	$ —
2022	—
2023	—
2024	19,565
2025 and thereafter	55,435
	$ 75,000

7. Equity

On July 20, 2018, the Company filed a restated certificate of incorporation in the State of Delaware, which, among other things, restated the number of shares of all classes of stock that the Company has authority to issue to 160,000,000 shares, consisting of (i) 150,000,000 shares of common stock, $0.001 par value per share, and (ii) 10,000,000 shares of preferred stock, $0.001 par value per share. The preferred stock will have such rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation preferences, as shall be determined by the Company's board of directors upon issuance. The shares of preferred stock are currently undesignated.

On August 1, 2019, the Company entered into a Distribution Agreement (the "Distribution Agreement") with J.P. Morgan Securities LLC, Jefferies LLC and SVB Leerink LLC (the "Sales Agents"), pursuant to which the Company may issue and sell, from time to time, shares of its common stock having an aggregate offering price of up to $100.0 million through the Sales Agents. The Company's registration statement on Form S-3 filed on August 1, 2019 was declared effective on August 21, 2019. The Sales Agents may sell common stock by any method permitted by law deemed to be an "at the market offering" as defined in Rule 415(a)(4) of the Securities Act of 1933, as amended, including sales made directly on or through the Nasdaq Global Select Market or any other existing trade market for the common stock, in negotiated transactions at market prices prevailing at the time of sale or at prices related to prevailing market prices, or any other method permitted by law. The Sales Agents will be entitled to receive 3.0% of the gross sales price per share of common stock sold pursuant to the Distribution Agreement. As of June 30, 2021, no shares of common stock have been issued and sold pursuant to the Distribution Agreement.

On March 18, 2021, the Company completed the March 2021 Offering, pursuant to which it issued and sold 6,896,552 shares of common stock. The aggregate net proceeds received by the Company from the March 2021 Offering were $187.2 million, after deducting underwriting discounts and commissions and other offering costs.

8. Stock-Based Compensation

Service-Based Stock Options

During the six months ended June 30, 2021, the Company granted options with service-based vesting conditions for the purchase of 3,078,080 shares of common stock with a weighted average exercise price of $14.88 per share and a weighted average grant-date fair value of $9.91 per share.

Stock-Based Compensation

The Company recorded stock-based compensation expense in the following expense categories of its condensed consolidated statements of operations and comprehensive loss (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2021	2020	2021	2020
Research and development expenses	$ 3,056	$ 2,058	$ 5,587	$ 4,169
General and administrative expenses	6,541	6,194	12,652	12,571
	$ 9,597	$ 8,252	$ 18,239	$ 16,740

As of June 30, 2021, total unrecognized compensation cost related to the unvested stock-based awards was $58.6 million, which is expected to be recognized over a weighted average period of 2.4 years.

9. Commitments and Contingencies

License Agreement with the Whitehead Institute for Biomedical Research

The Company has a license agreement with the Whitehead Institute for Biomedical Research (“WIBR”) under which the Company has been granted an exclusive, sublicensable, nontransferable license under certain patent families related to the development of the Company’s red cell therapies (as amended, the “WIBR License”). The Company is obligated to pay WIBR annual license maintenance fees of less than $0.1 million, as well as patent-related costs, including legal fees, and low single-digit royalties based on annual net sales of licensed products and licensed services by the Company and its sublicensees. Based on the progress the Company makes in the advancement of products covered by the licensed patent rights, the Company is required to make aggregate milestone payments of up to $1.6 million upon the achievement of specified preclinical, clinical and regulatory milestones. In addition, the Company is required to pay to WIBR a percentage of the non-royalty payments that it receives from sublicensees of the patent rights licensed by WIBR. This percentage varies from low single-digit to low double-digit percentages and will be based upon the clinical stage of the product that is the subject of the sublicense. Royalties shall be paid by the Company on a licensed product-by-licensed product and country-by-country basis, beginning on the first commercial sale of such licensed product in such country until expiration of the last valid patent claim covering such licensed product in such country.

The Company has the right to terminate the WIBR License in its entirety, on a patent-by-patent or country-by-country basis, at will upon three months’ notice to WIBR. WIBR may terminate the agreement upon breach of contract or in the event of the Company’s bankruptcy, liquidation, insolvency or cessation of business related to the license.

401(k) Plan

In January 2018, the Company established a defined-contribution plan under Section 401(k) of the Internal Revenue Code (the “401(k) Plan”). The 401(k) Plan covers all employees who meet defined minimum age and service requirements and allows participants to defer a portion of their annual compensation on a pre-tax basis. The Company will make matching contributions at a rate of 50% of each employee’s contribution up to a maximum employee contribution of 6% of eligible plan compensation. For the three and six months ended June 30, 2021, the Company made matching contributions of $0.2 million and $0.5 million, respectively.

Indemnification Agreements

In the ordinary course of business, the Company may provide indemnification of varying scope and terms to vendors, lessors, contract research organizations, business partners and other parties with respect to certain matters including, but not limited to, losses arising out of breach of such agreements or from intellectual property infringement claims made by third parties. In addition, the Company has entered into indemnification agreements with members of its board of directors and executive officers that will require the Company, among other things, to indemnify them against certain liabilities that may arise by reason of their status or service as directors or officers. The maximum potential amount of future payments the Company could be required to make under these indemnification agreements is, in many cases, unlimited. The Company has not incurred any material costs as a result of such indemnifications and is not currently aware of any indemnification claims.

Legal Proceedings

The Company is not currently party to any material legal proceedings. At each reporting date, the Company evaluates whether or not a potential loss amount or a potential range of loss is probable and reasonably estimable under the provisions of the authoritative guidance that addresses accounting for contingencies. The Company expenses as incurred the costs related to such legal proceedings.

10. Net Loss per Share

Basic and diluted net loss per share was calculated as follows (in thousands, except share and per share amounts):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2021	2020	2021	2020
Numerator:				
Net loss	$ (50,180)	$ (37,854)	$ (92,510)	$ (86,340)
Denominator:				
Weighted average common shares outstanding, basic and diluted	89,517,784	80,481,756	85,936,079	80,376,830
Net loss per share, basic and diluted	$ (0.56)	$ (0.47)	$ (1.08)	$ (1.07)

The Company's potential dilutive securities have been excluded from the computation of diluted net loss per share as the effect would be to reduce the net loss per share. Therefore, the weighted average number of common shares outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same. The Company excluded the following potential common shares from the periods in the table above, presented based on amounts outstanding at each period end, from the computation of diluted net loss per share attributable to common stockholders for the periods indicated because including them would have had an anti-dilutive effect:

	June 30,	
	2021	2020
Unvested restricted common stock	708,668	252,000
Stock options to purchase common stock	17,195,305	16,948,843
	17,903,973	17,200,843

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

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our condensed consolidated financial statements and related notes appearing elsewhere in this Quarterly Report on Form 10-Q and our Annual Report on Form 10-K for the year ended December 31, 2020 filed with the Securities and Exchange Commission, or SEC, on February 23, 2021. Some of the information contained in this discussion and analysis or set forth elsewhere in this Quarterly Report on Form 10-Q, including information with respect to our plans and strategy for our business, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in the "Risk Factors" section of this Quarterly Report on Form 10-Q, our actual results could differ materially from the results described in, or implied by, the forward-looking statements contained in the following discussion and analysis.

Overview

We are a clinical-stage biopharmaceutical company that is genetically engineering red blood cells to create an entirely new class of cellular medicines called Red Cell Therapeutics, or RCTs, for the treatment of cancer and autoimmune diseases. Based on the premise that human red blood cells are the foundation of the next significant innovation in medicine, we have designed a proprietary and highly versatile platform, called the RED PLATFORM, to genetically engineer and culture RCTs that are selective, potent and ready-to-use cellular therapies. RCTs are expected to provide advantages over other cell therapies, or agonist antibody and recombinant cytokine approaches, including generating a broad anti-tumor response with a wide therapeutic window and limited side effects given the biodistribution of RCTs to the vasculature and spleen. Additionally, RCTs do not have the complex logistics of other cell therapies, as RCT are prepared in the pharmacy, administered in an outpatient setting and do not require lymphodepletion prior to administration.

In the second quarter of 2021, we demonstrated strong execution across our pipeline of Red Cell Therapeutics by making significant progress advancing in our oncology programs, including our lead clinical candidate, RTX-240, and our lead artificial antigen-presenting cell, or aAPC, program, RTX-321. We presented initial safety and efficacy data from the ongoing RTX-240 Phase 1/2 clinical trial in relapsed/refractory or locally advanced solid tumors at the American Association for Cancer Research, or AACR, conference in April 2021. In the preliminary safety (n=16) and efficacy (n=15) findings, we observed single-agent activity of RTX-240 with no Grade 3 or 4 adverse events or dose-limiting toxicities. We continue to enroll patients in a second Phase 1 arm of the trial that is evaluating RTX-240 as a single-agent for the treatment of relapsed/refractory acute myeloid leukemia, or AML, and, in June 2021, initiated a third Phase 1 arm of RTX-240 in combination with pembrolizumab for the treatment of relapsed/refractory or locally advanced solid tumors, in which we are currently dosing patients. We are also currently dosing patients in the Phase 1 clinical trial of RTX-321 in patients with advanced human papillomavirus, or HPV, 16-positive cancers, including cervical cancer, head and neck cancer and anal cancer. Our manufacturing facility in Smithfield, Rhode Island, continues to provide cGMP supply for these three ongoing clinical trials.

We believe the initial clinical data from the RTX-240 clinical trial provides initial proof-of-concept of the RED PLATFORM by providing evidence that red blood cells can be engineered to mimic the human immune system and stimulate adaptive and innate immunity to generate clinical responses in cancer patients with refractory disease.

Finally, we continue to advance our earlier-stage autoimmune program in Type I diabetes and explore ways in which to apply the RED PLATFORM across the remainder of our pipeline.

Highlights of our most advanced RCT product candidates, RTX-240 and RTX-321, are described further below.

RTX-240

RTX-240 is an allogeneic, off-the-shelf cellular therapy product candidate that is engineered to replicate human immune system function by stimulating adaptive and innate immunity to generate an anti-tumor immune response. As shown in preclinical studies, RTX-240 expresses hundreds of thousands of copies of the costimulatory molecule 4-1BB ligand (4-1BBL) and the cytokine IL-15TP (a fusion of IL-15 and IL-15 receptor alpha) on the cell surface in their native forms.

By activating existing agonist pathways, RTX-240 has the potential to enhance potency and improve anti-tumor activity, overcome resistance to immunotherapy and have a reduced toxicity profile given its biodistribution in the vasculature and the spleen.

We are currently dosing patients with RTX-240 in three separate Phase 1 arms in the ongoing Phase 1/2 clinical trial of RTX-240: as a single-agent for the treatment of patients with relapsed/refractory or locally advanced solid tumors, as a single-agent for the treatment of patients with relapsed/refractory AML and as a combination therapy with pembrolizumab for the treatment of patients with relapsed/refractory or locally advanced solid tumors, which began dosing patients in June 2021. To be eligible for the combination arm, patients must have disease that is relapsed or refractory to an anti-PD-1 or PD-L1 therapy. We believe that RTX-240, with its mechanism of action as a broad immune agonist, may have synergy with immune checkpoint inhibition and potentially overcome resistance to PD-1 inhibition. Preliminary data from our single-agent RTX-240 Phase 1 study reported in March 2021 showed early evidence of favorable immune-permissive changes in the tumor microenvironment, or TME, in three out of four patient biopsies, including increased expression of PD-L1 and/or increased ratio of M1/M2 macrophages after treatment with RTX-240, suggesting single-agent RTX-240 is able to induce changes in the TME that have been associated with response to checkpoint inhibition.

During the second quarter of 2021, we added two additional cohorts to our single-agent RTX-240 Phase 1/2 clinical trial in relapsed/refractory or locally advanced solid tumors, to explore the dose of RTX-240 with a more frequent schedule of administration. Enrollment in these cohorts continues in the third quarter. The changes in dose and schedule are supported by initial clinical activity, safety data and no dose-limiting toxicities observed to date along with additional emerging data from dose escalation in the Phase 1 study. We plan to present comprehensive results from this study at the end of 2021 or during the first quarter of 2022.

In July 2021, the paper entitled “Anti-Tumor Effects of RTX-240: an Engineered Red Blood Cell Expressing 4-1BB Ligand and Interleukin-15” was published in the peer-reviewed journal *Cancer Immunology, Immunotherapy*. The publication highlights preclinical findings and demonstrates that RTX-240 activates and expands CD8+ T cells and NK cells in vitro and in vivo generating potent anti-tumor activity in both a colorectal and melanoma model.

In March 2021, we reported initial safety (n=16) and efficacy (n=15) data from the RTX-240 Phase 1/2 clinical trial in relapsed/refractory or locally advanced solid tumors. These data were presented at the AACR conference in April. Five dose cohorts were completed at the time of the data cutoff on February 28, 2021 and the data analysis was based on RECIST v1.1. criteria. We observed the following:

- no treatment-related Grade 3 or Grade 4 adverse events or dose limiting toxicities;
- most common treatment-related Grade 1/2 adverse events were fatigue, chills, nausea, decreased appetite and arthralgias. There was a single Grade 1 event of liver toxicity;
- two responses were observed in the study including a confirmed partial response, or PR, in a patient with metastatic anal cancer and an unconfirmed PR in a patient with metastatic uveal melanoma. Both patients’ disease had progressed on prior anti PD-L1 and anti-PD-1 therapy, respectively;
- stable disease, or SD, was observed in six patients, including four patients with stable disease for at least 12 weeks in non-small cell lung cancer, soft tissue sarcoma, pancreatic cancer and prostate cancer;
- pharmacodynamic effects showed the activation and/or expansion of the key NK and/or T cells types in all patients (n=16); and
- analysis of tumor biopsies from two solid tumor and one AML patient showed evidence of immune cell trafficking of activated NK and T cells into the tumor microenvironment.

We are continuing to enroll patients and optimize the dose and schedule in the Phase 1 arm of the ongoing RTX-240 Phase 1/2 clinical trial for the treatment of relapsed/refractory AML. In March 2021, we presented preliminary trafficking data from the first AML patient in the trial, indicating strong accumulation of activated, granzyme B-positive NK and T cells in the bone marrow, which is the site of disease in AML. NK cells can exhibit potent anti-tumor activity against AML, but tumor-associated mechanisms often suppress the proper function of NK cells leading to disease progression. When NK cells are restored to their full anti-tumor potential, their cytolytic activity predicts a better long-term outcome for patients with AML. Reconstitution of NK cells post high-dose chemotherapy or transplant are strong prognostic indicators of overall survival. We believe RTX-240 could potentially provide benefit as a maintenance therapy for AML patients in remission following chemotherapy or transplantation, given its preliminary favorable safety profile seen to date and unique mechanism of action designed to activate and expand NK and T cells.

RTX-321

We are dosing patients in a Phase 1 clinical trial for RTX-321 for the treatment of patients with HPV 16-positive cancers. RTX-321 is an allogeneic, off-the-shelf aAPC therapy product candidate that is engineered to induce a tumor-specific immune response by expanding antigen-specific T cells. RTX-321 expresses hundreds of thousands of copies of an HPV peptide antigen bound to major histocompatibility complex, or MHC, class I proteins, the costimulatory molecule 4-1BBL and the cytokine IL-12 on the cell surface to mimic human T cell-APC interactions. As part of our IND filing, we included frozen drug substance for the first time as part of the manufacturing process, allowing a truly off-the-shelf cellular therapy product candidate with a potential shelf life of several years based on preliminary stability data.

HPV 16 is associated with approximately 70% of cervical cancers, approximately 40% of head and neck squamous cell carcinoma, or HNSCC, arising in the oropharynx, approximately 25%-40% of HNSCC arising in other locations and approximately 80%-85% of anal cancers. A critical need remains for better treatment options for advanced HPV 16 associated cancers. The prognosis remains poor for patients with metastatic disease with few treatment options beyond the first-line setting.

In May 2021, a peer-reviewed manuscript for RTX-321 was published in *Nature Communications*, highlighting preclinical findings demonstrating that the surrogate model of RTX-321 induced a broad immune response, epitope spreading and memory formation in preclinical models.

We believe these findings support the potential of RTX-321 as an effective therapy for the treatment of HPV 16+ cancers.

Manufacturing

We have generated hundreds of RCT product candidates using our RED PLATFORM and are utilizing our universal engineering and manufacturing processes to advance a broad pipeline of RCT product candidates into clinical trials in cancer and autoimmune diseases. Common design and manufacturing elements of our RCTs should enable us to achieve significant advantages in product development. Recognizing the importance of controlling our own manufacturing capabilities to produce consistent and reproducible product at greater scale, we acquired, renovated and operationalized a manufacturing facility in Smithfield, RI, that is are currently providing cGMP supply for our four ongoing Phase 1 clinical trials: RTX-240 in advanced solid tumors, RTX-240 in relapsed/refractory AML, RTX-240 in combination with pembrolizumab and RTX-321 in HPV 16-positive cancers. Since operationalizing the facility, we have achieved the following milestones:

- increased productivity in manufacturing of cGMP supply of RTX-240 in 50L bioreactors;
- increased RTX-240 liquid in-vial shelf life from approximately 28 to 52 days;
- for RTX-240, continuously met red blood cell identity (CD233+, mean corpuscular hemoglobin, purity, enucleation cell population) and target product profile criteria (protein expression, cell viability) for clinical supply lots; and

- introduced frozen drug substance for RTX-321, resulting in a truly off-the-shelf potential cellular therapy with a potential shelf life of up to several years. Following liquid reformulation, RTX-321 drug product has an in-vial shelf life of 52 days.

Since our inception, we have focused substantially all of our resources on building our proprietary RED PLATFORM, establishing and protecting our intellectual property portfolio, conducting research and development activities, developing our manufacturing process and manufacturing drug product material, organizing and staffing our company, business planning, raising capital and providing general and administrative support for these operations. We do not have any products approved for sale and have not generated any revenue from product sales. To date, we have funded our operations with proceeds from the sale of preferred stock and issuance of debt and with proceeds from our public offerings.

On July 20, 2018, we completed our IPO pursuant to which we issued and sold 12,055,450 shares of common stock, inclusive of 1,572,450 shares pursuant to the full exercise of the underwriters' option to purchase additional shares. We received proceeds of $254.3 million after deducting underwriting discounts and commissions and other offering costs. In August 2019, we entered into a Distribution Agreement with J.P. Morgan Securities LLC, Jefferies LLC and SVB Leerink LLC with respect to an at-the-market, or ATM, offering program under which we may offer and sell, from time to time at our sole discretion, shares of our common stock, having aggregate gross proceeds of up to $100.0 million. We have not yet sold any shares of our common stock under the ATM offering program. In March 2021, we completed an underwritten public offering, or the March 2021 Offering, pursuant to which we issued and sold 6,896,552 shares of common stock. We received proceeds of $187.2 million, after deducting underwriting discounts and commissions and other offering costs.

Since our inception, we have incurred significant operating losses. Our ability to generate any product revenue or product revenue sufficient to achieve profitability will depend on the successful development and eventual commercialization of one or more of our product candidates. We reported net losses of $92.5 million for the six months ended June 30, 2021 and $167.7 million for the year ended December 31, 2020. As of June 30, 2021, we had an accumulated deficit of $573.0 million. We expect to continue to incur significant expenses and operating losses for at least the next several years. We expect that our expenses and capital requirements will increase in connection with our ongoing activities, particularly if, and as, we:

- conduct clinical trials for our product candidates and to the extent we continue to experience delays, setbacks or disruptions to our preclinical studies, clinical trials or clinical supply chain due to the COVID-19 pandemic;
- further develop our RED PLATFORM;
- continue to discover and develop additional product candidates;
- maintain, expand and protect our intellectual property portfolio;
- hire additional clinical, scientific, manufacturing and commercial personnel;
- expand in-house manufacturing capabilities, including through the operation and any future renovation or expansion of our manufacturing facility;
- establish a commercial manufacturing source and secure supply chain capacity sufficient to provide commercial quantities of any product candidates for which we may obtain regulatory approval;
- acquire or in-license other product candidates and technologies;
- seek regulatory approvals for any product candidates that successfully complete clinical trials;

- establish a sales, marketing and distribution infrastructure to commercialize any products for which we may obtain regulatory approval; and

- add operational, financial and management information systems and personnel, including personnel to support our product development and planned future commercialization efforts, as well as to continue to support the requirements of a public company.

We will not generate revenue from product sales unless and until we successfully complete clinical development and obtain regulatory approval for our product candidates. If we obtain regulatory approval for any of our product candidates, we expect to incur significant expenses related to developing our commercialization capability to support product sales, marketing and distribution. Further, we expect to continue to incur costs associated with operating as a public company.

As a result, we will need substantial additional funding to support our continuing operations and pursue our growth strategy. Until such time as we can generate significant revenue from product sales, if ever, we expect to finance our operations through a combination of public and private equity financings, debt financings, collaborations, strategic alliances and marketing, distribution and licensing arrangements. We may be unable to raise additional funds or enter into such other agreements or arrangements when needed on favorable terms, or at all. Furthermore, the terms of any financing may adversely affect the holdings or the rights of our stockholders. If we are unable to obtain funding, we may need to delay, scale back or discontinue some or all of our research and development programs, product portfolio expansion or commercialization efforts, which could adversely affect our business prospects.

Because of the numerous risks and uncertainties associated with pharmaceutical product development, we are unable to accurately predict the timing or amount of increased expenses or when, or if, we will be able to achieve or maintain profitability. Even if we are able to generate product sales, we may not become profitable. If we fail to become profitable or are unable to sustain profitability on a continuing basis, then we may be unable to continue our operations at planned levels and be forced to reduce or terminate our operations.

As of June 30, 2021, we had cash, cash equivalents and investments of $298.2 million. In June 2021, we entered an amendment to our loan and security agreement, which provides for an extension of the interest-only period from December 21, 2021 until July 1, 2024. We believe that our existing cash, cash equivalents and investments will enable us to fund our operating expenses, capital expenditure requirements and debt service payments for at least 12 months from the issuance date of these condensed consolidated financial statements. See “—Liquidity and Capital Resources.”

Impact of the Ongoing COVID-19 Pandemic

Since March of 2020 and throughout the ongoing COVID-19 pandemic, we have implemented various precautionary measures to protect the health and safety of our employees, partners and prospective clinical trial participants and to comply with applicable national, state and local governmental orders, proclamations and/or directives in effect at any time aimed at minimizing the spread of COVID-19. Such measures included, at certain times, the elimination of business travel, shifting to remote work wherever possible and implementing rotating laboratory work schedules to reduce the number of people onsite at our facilities, as well as working with our external partners and clinical sites to utilize virtual clinical trial site training and monitoring, minimizing patient visits and instituting telemedicine to minimize patient exposure. We will continue to use these and other precautionary measures as required until such time as the ongoing COVID-19 pandemic, including any subsequent outbreak whether or not due to emerging variants thereof, is contained.

While the ongoing COVID-19 pandemic has impacted manufacturing, supply chain and clinical trial activities worldwide, including those of our suppliers, vendors and clinical trial sites, these disruptions did not significantly impact our results of operations during 2020 or 2021 to date. The ultimate impact on our operations, however, is unknown and will depend on future developments, such as the duration, spread and intensity of the pandemic, among others, which are highly uncertain and cannot be predicted with confidence. In particular, global developments concerning COVID-19, including the identification of new strains of coronavirus, and the magnitude of interventions to contain the spread of viruses, such as government-mandated quarantines, shelter-in-place mandates, restrictions on travel, shutdowns for non-essential businesses, requirements regarding social distancing, impact of government-imposed restrictions on the global

supply chain, including through use of the Defense Production Act, distribution of vaccines and other public health safety measures, will determine the impact of the pandemic on our business. We are continuing to monitor the latest developments regarding the ongoing COVID-19 pandemic and its impact on our business, financial condition, results of operations and prospects. However, any resulting financial impact cannot be reasonably estimated at this time and may have a material adverse impact on our business, financial condition and results of operations.

Recent Developments

During the third quarter of 2021, we strengthened our leadership team by appointing Dannielle Appelhans as Chief Operating Officer. Ms. Appelhans brings significant experience in building organizations as they evolve from early- to late-stage development, with a particular focus on clinical and commercial manufacturing and scaling supply chains.

Components of Our Results of Operations

Revenue

To date, we have not generated any revenue from product sales and do not expect to generate any revenue from the sale of products in the near future. If our development efforts for our product candidates are successful and result in regulatory approval or license or collaboration agreements with third parties, we may generate revenue in the future from product sales, payments from collaboration or license agreements that we may enter into with third parties, or any combination thereof.

Operating Expenses

Research and Development Expenses

Research and development expenses consist of costs incurred for our research activities, including our drug discovery efforts, and the development and manufacturing of our product candidates, which include:

- employee-related expenses, including salaries, related benefits and stock-based compensation expense for employees engaged in research and development functions;
- expenses incurred in connection with the preclinical and clinical development of our product candidates and research programs, including under agreements with third parties, such as consultants, contractors and contract research organizations, or CROs;
- the cost of developing and scaling our manufacturing process and manufacturing drug products for use in our preclinical studies and clinical trials, including under agreements with third parties, such as consultants, contractors and any contract manufacturing organizations, or CMOs, that we may engage, as well as in our manufacturing facility;
- laboratory supplies and research materials;
- facilities, depreciation and other expenses, which include direct and allocated expenses for rent and maintenance of facilities and insurance; and
- payments made under third-party licensing agreements.

We expense research and development costs as incurred. Advance payments that we make for goods or services to be received in the future for use in research and development activities are recorded as prepaid expenses. The prepaid amounts are expensed as the related goods are delivered or the services are performed.

Our direct research, manufacturing and development expenses are tracked on a program-by-program basis for clinical candidates. These consist mostly of fees, reimbursed materials, testing and other costs paid to consultants, contractors, CMOs and CROs, as well as the cost of materials incurred for internal manufacturing. In addition, we allocate the cost of operating our manufacturing facility to research and development program costs, consisting of associated personnel costs, other than stock-based compensation expense, and manufacturing facility costs, including depreciation. We do not allocate costs associated with our platform development, early stage research and shared research and development, including associated personnel costs, laboratory supplies, non-manufacturing facilities expenses and other indirect costs, to research and development programs, because these costs are deployed across multiple programs and our technology platform and, as such, are not separately classified.

Product candidates in later stages of clinical development generally have higher development costs than those in earlier stages of clinical development, due to the increased size and duration of later-stage clinical trials. We expect that our research and development expenses will increase substantially in connection with our planned preclinical and clinical development activities in the future. At this time, we cannot accurately estimate or know the nature, timing and costs of the efforts that will be necessary to complete the preclinical and clinical development of any of our product candidates. The successful development and commercialization of our product candidates is highly uncertain. This is due to the numerous risks and uncertainties associated with product development and commercialization, including the following:

- the timing and progress of preclinical and clinical development activities;
- the number and scope of preclinical and clinical programs we decide to pursue;
- our ability to raise the additional funds necessary to complete preclinical and clinical development of and commercialize our drug candidates;
- the progress of the development efforts of parties with whom we may enter into collaboration arrangements;
- our ability to maintain our current research and development programs and to establish new ones;
- our ability to establish new licensing or collaboration arrangements;
- the successful initiation and completion of clinical trials with safety, tolerability and efficacy profiles that are satisfactory to the U.S. Food and Drug Administration, or FDA, or any comparable foreign regulatory authority;
- the continued impact of the COVID-19 pandemic, including from any subsequent outbreak whether or not due to emerging variants thereof, on our operations, clinical trials and supply chain;
- the receipt and related terms of regulatory approvals from applicable regulatory authorities;
- the availability of specialty raw materials for use in production of our product candidates;
- our ability to consistently manufacture our product candidates for use in clinical trials;
- our ability to operate a manufacturing facility, or secure manufacturing supply through relationships with third parties;
- our ability to obtain and maintain patents, trade secret protection and regulatory exclusivity, both in the United States and internationally;
- our ability to protect our rights in our intellectual property portfolio;
- our ability to successfully commercialize our product candidates, if and when approved;

- our ability to obtain and maintain third-party insurance coverage and adequate reimbursement;
- the acceptance of our product candidates, if approved, by patients, the medical community and third-party payors;
- competition with other products; and
- a continued acceptable safety profile of our therapies following approval.

A change in the outcome of any of these variables with respect to the development of any of our product candidates could significantly change the costs and timing associated with the development of that product candidate. We may never succeed in obtaining regulatory approval for any of our product candidates.

General and Administrative Expenses

General and administrative expenses include salaries and related costs, including stock-based compensation, for personnel in executive, finance and administrative functions. General and administrative expenses also include direct and allocated facility-related costs, as well as professional fees for legal, patent, consulting, investor and public relations, accounting and audit services. We anticipate that our general and administrative expenses may increase in the future as we continue to build infrastructure to support the expansion of our research activities, development of our product candidates and any expanded compliance requirements.

Other Income (Expense)

Interest Income

Interest income consists of interest earned on our invested cash balances.

Interest Expense

Interest expense consists of interest expense on outstanding borrowings under our loan and security agreements, as well as amortization of debt discount and debt issuance costs.

Other Income, Net

Other income, net consists of income earned under a sublease agreement and miscellaneous income and expense unrelated to our core operations.

Income Taxes

Since our inception, we have not recorded any income tax benefits for the net losses we have incurred in each year or for our research and development tax credits generated, as we believe, based upon the weight of available evidence, that it is more likely than not that all of our net operating loss, or NOL, carryforwards and tax credits will not be realized. As of December 31, 2020, we had U.S. federal and state net operating loss carryforwards of $357.3 million and $360.1 million, respectively, which may be available to offset future taxable income. The federal NOLs include $37.2 million, which expire at various dates through 2037, and $320.1 million, which carryforward indefinitely. The state NOLs expire at various dates through 2040. As of December 31, 2020, we also had U.S. federal and state research and development tax credit carryforwards of $15.3 million and $9.0 million, respectively, which may be available to offset future tax liabilities and begin to expire in 2034 and 2026, respectively. We have recorded a full valuation allowance against our net deferred tax assets at each balance sheet date.

Results of Operations

Comparison of the Three Months Ended June 30, 2021 and 2020

The following table summarizes our results of operations for the three months ended June 30, 2021 and 2020:

	Three Months Ended June 30,		
	2021	2020	Change
	(in thousands)		
Revenue	$ —	$ —	$ —
Operating expenses:			
Research and development	36,072	26,096	9,976
General and administrative	13,851	11,601	2,250
Total operating expenses	49,923	37,697	12,226
Loss from operations	(49,923)	(37,697)	(12,226)
Other income (expense):			
Interest income	26	410	(384)
Interest expense	(1,312)	(828)	(484)
Other income, net	1,029	261	768
Total other income (expense), net	(257)	(157)	(100)
Net loss	$ (50,180)	$ (37,854)	$ (12,326)

Research and Development Expenses

	Three Months Ended June 30,		
	2021	2020	Change
	(in thousands)		
Research and development program expenses:			
Rare disease	$ —	$ 24	$ (24)
Cancer	19,855	10,721	9,134
Platform development, early-stage research and unallocated expenses:			
Personnel-related	6,937	5,710	1,227
Stock-based compensation expense	3,056	2,058	998
Contract research and development	1,707	1,658	49
Laboratory supplies and research materials	805	2,386	(1,581)
Facility related and other	3,712	3,563	149
Total research and development expenses	$ 36,072	$ 26,096	$ 9,976

Research and development expenses were $36.1 million for the three months ended June 30, 2021, compared to $26.1 million for the three months ended June 30, 2020. The increase in direct costs of $9.1 million in our lead cancer programs, including RTX-240 and RTX-321, was principally related to CRO and internal manufacturing costs incurred in connection with both arms of our Phase 1/2 clinical trial of RTX-240 for the treatment of solid tumors and AML and for our Phase 1 clinical trial of RTX-321 for the treatment of HPV16-positive cancers. We expect these costs to continue to increase as we expand our clinical development activities in our cancer programs. Platform development, early-stage research and unallocated expenses increased by $0.8 million principally due to an increase of $1.2 million in personnel-related costs for additions to headcount to support our expanded operations. The increase in stock-based compensation expense of $1.0 million was driven by an increase in the market price of our common stock resulting in a higher valuation of options granted in 2021. These increases were offset by a $1.6 million decrease in laboratory supplies and research materials related to the increase in pilot-scale manufacturing activities to support technical development of clinical candidates.

General and Administrative Expenses

	Three Months Ended June 30,		
	2021	2020	Change
	(in thousands)		
Personnel-related	$ 3,429	$ 2,414	$ 1,015
Stock-based compensation expense	6,541	6,194	347
Professional and consultant fees	2,240	1,777	463
Facility related and other	1,641	1,216	425
Total general and administrative expenses	$ 13,851	$ 11,601	$ 2,250

General and administrative expenses were $13.9 million for the three months ended June 30, 2021, compared to $11.6 million for the three months ended June 30, 2020. The increase in general and administrative expenses of $2.3 million was primarily due to an increase in personnel-related expenses of $1.0 million resulting from rising headcount in our general and administrative function, including recruitment costs. In addition, the increase in professional and consultant fees of $0.5 million was driven by increased patent costs as we expand our patent portfolio and an increase of $0.4 million in facility related and other costs due to increases in building operating costs and non-capitalized software costs. Finally, the increase in stock-based compensation expense of $0.3 million was driven by an increase in the market price of our common stock resulting in a higher valuation of options granted in 2021.

Interest Income

Interest income was less than $0.1 million for the three months ended June 30, 2021, compared to $0.4 million for the three months ended June 30, 2020. Interest income decreased due to lower prevailing interest rates.

Interest Expense

Interest expense was $1.3 million for the three months ended June 30, 2021, compared to $0.8 million for the three months ended June 30, 2020. The increase in interest expense was principally due to higher outstanding borrowings in connection with our Amended 2018 Credit Facility (as defined below).

Other Income, Net

Other income, net was $1.0 million for the three months ended June 30, 2021, compared to $0.3 million for the three months ended June 30, 2020. The increase in other income, net was due to the monetization of certain tax credits during the period.

Comparison of the Six Months Ended June 30, 2021 and 2020

The following table summarizes our results of operations for the six months ended June 30, 2021 and 2020:

	Six Months Ended June 30,		
	2021	2020	Change
		(in thousands)	
Revenue	$ —	$ —	$ —
Operating expenses:			
Research and development	63,749	62,282	1,467
General and administrative	27,091	24,265	2,826
Total operating expenses	90,840	86,547	4,293
Loss from operations	(90,840)	(86,547)	(4,293)
Other income (expense):			
Interest income	52	1,459	(1,407)
Interest expense	(3,060)	(1,813)	(1,247)
Other income, net	1,338	561	777
Total other income (expense), net	(1,670)	207	(1,877)
Net loss	$ (92,510)	$ (86,340)	$ (6,170)

Research and Development Expenses

	Six Months Ended June 30,		
	2021	2020	Change
		(in thousands)	
Research and development program expenses:			
Rare disease	$ 217	$ 6,922	$ (6,705)
Cancer	31,578	20,636	10,942
Platform development, early-stage research and unallocated expenses:			
Personnel-related	13,326	13,857	(531)
Stock-based compensation expense	5,587	4,169	1,418
Contract research and development	3,035	4,274	(1,239)
Laboratory supplies and research materials	2,565	5,387	(2,822)
Facility related and other	7,441	7,037	404
Total research and development expenses	$ 63,749	$ 62,282	$ 1,467

Research and development expenses were $63.7 million for the six months ended June 30, 2021, compared to $62.3 million for the six months ended June 30, 2020. The decrease in direct costs related to our rare disease program of $6.7 million was due to the decision in March 2020 to deprioritize development of our rare disease programs and discontinue the RTX-134 Phase 1b clinical trial. The increase in direct costs of $10.9 million in our lead cancer programs, including RTX-240 and RTX-321, was principally related to costs incurred for our Phase 1/2 clinical trial of RTX-240 for the treatment of solid tumors, including clinical CRO and internal manufacturing costs, as well as costs incurred for our Phase 1 clinical trial of RTX-321 in patients with advanced HPV 16-positive cancers. The reduction in contract research and development and laboratory supplies and research materials of $1.2 million and $2.8 million, respectively, were mostly due to the shift from pilot-scale manufacturing activities to manufacturing activities necessary to support the technical development of clinical candidates. Personnel-related costs also reduced by $0.5 million as a result of non-recurring expenses incurred in the first quarter of 2020. The increase in stock-based compensation expense of $1.4 million was driven by an increase in the market price of our common stock resulting in a higher valuation of options granted in 2021. Finally, facility related and other costs increased by $0.4 million due to increases in building operating costs.

General and Administrative Expenses

	Six Months Ended June 30,		
	2021	2020	Change
		(in thousands)	
Personnel-related	$ 6,553	$ 5,499	$ 1,054
Stock-based compensation expense	12,652	12,571	81
Professional and consultant fees	4,516	3,613	903
Facility related and other	3,370	2,582	788
Total general and administrative expenses	$ 27,091	$ 24,265	$ 2,826

General and administrative expenses were $27.1 million for the six months ended June 30, 2021, compared to $24.3 million for the six months ended June 30, 2020. The increase in general and administrative expenses of $2.8 million was primarily due to an increase in personnel-related expenses of $1.1 million resulting from rising headcount in our general and administrative function, including recruitment costs. In addition, the increase in professional and consultant fees of $0.9 million was driven by increased patent costs as we expand our patent portfolio and the increase of $0.8 million in facility related and other costs was due to increases in building operating costs and non-capitalized software costs.

Interest Income

Interest income was less than $0.1 million for the six months ended June 30, 2021, compared to $1.5 million for the six months ended June 30, 2020. Interest income decreased due to lower prevailing interest rates.

Interest Expense

Interest expense was $3.1 million for the six months ended June 30, 2021, compared to $1.8 million for the six months ended June 30, 2020. The increase in interest expense was principally due to higher outstanding borrowings in connection with our Amended 2018 Credit Facility.

Other Income, Net

Other income, net was $1.3 million for the six months ended June 30, 2021, compared to $0.6 million for the six months ended June 30, 2020. The increase in other income, net was due to the monetization of certain tax credits during the period.

Liquidity and Capital Resources

Since our inception, we have incurred significant operating losses. We have not yet commercialized any of our product candidates and we do not expect to generate revenue from sales of any product candidates for several years, if at all. To date, we have funded our operations with proceeds from the sale of preferred stock, with the issuance of debt, with proceeds from our IPO and, most recently, with proceeds from our March 2021 Offering, described and defined further below. As of June 30, 2021, we had cash, cash equivalents and investments of $298.2 million. In July 2018, we completed our IPO, pursuant to which we issued and sold 12,055,450 shares of common stock, inclusive of 1,572,450 shares pursuant to the full exercise of the underwriters' option to purchase additional shares. We received proceeds of $254.3 million, after deducting underwriting discounts and commissions and other offering costs. In December 2018, we entered into a loan and security agreement which provides for aggregate borrowings of up to $75.0 million, all of which were outstanding as of June 30, 2021. In March 2021, we completed the March 2021 Offering, pursuant to which we issued and sold 6,896,552 shares of common stock. We received proceeds of $187.2 million, after deducting underwriting discounts and commissions and other offering costs. In June 2021, we entered an amendment to our loan and security agreement, which provides for an extension of the interest-only period until July 1, 2024.

Cash Flows

The following table summarizes our sources and uses of cash for each of the periods presented:

	Six Months Ended June 30,	
	2021	2020
	(in thousands)	
Cash used in operating activities	$ (73,459)	$ (68,567)
Cash provided by investing activities	68,409	80,091
Cash provided by financing activities	197,118	25,742
Net increase in cash, cash equivalents and restricted cash	$ 192,068	$ 37,266

Operating Activities

During the six months ended June 30, 2021, operating activities used $73.5 million of cash, primarily resulting from our net loss of $92.5 million, offset by net non-cash charges of $22.2 million, predominantly consisting of stock-based compensation expense. Net cash used in our operating assets and liabilities for the six months ended June 30, 2021 consisted of a $5.0 million decrease in accounts payable, accrued expenses and other current liabilities, other long-term liabilities and operating lease liabilities, offset by a decrease in prepaid expenses and other current assets and operating lease, right-of-use asset of $1.9 million.

During the six months ended June 30, 2020, operating activities used $68.6 million of cash, primarily resulting from our net loss of $86.3 million, offset by net non-cash charges of $20.5 million, predominantly consisting of stock-based compensation expense. Net cash used in our operating assets and liabilities for the six months ended June 30, 2020 consisted of a $3.2 million decrease in accounts payable, accrued expenses and other current liabilities, other long-term liabilities and operating lease liabilities, offset by a decrease in prepaid expenses and other current assets, other assets and operating lease, right-of-use asset of $0.5 million.

Investing Activities

During the six months ended June 30, 2021, net cash provided by investing activities was $68.4 million, consisting of sales and maturities of investments of $70.0 million, offset by purchases of property, plant and equipment of $1.6 million. Our cash purchases of property, plant and equipment relate to the purchase of computer and laboratory equipment installed in our manufacturing facility in Smithfield, Rhode Island and our laboratory space in Cambridge, Massachusetts.

During the six months ended June 30, 2020, net cash provided by investing activities was $80.1 million, consisting of sales and maturities of investments of $141.5 million, offset by net purchases of investments of $57.5 million and purchases of property, plant and equipment of $3.9 million. Our cash purchases of property, plant and equipment consisted of $2.2 million for purchases related to our manufacturing facility in Smithfield, Rhode Island, largely related to payments for manufacturing equipment purchases and construction costs incurred in 2019, and $1.7 million for the purchase of computer and laboratory equipment installed in our manufacturing facility and our laboratory space in Cambridge, Massachusetts.

Financing Activities

During the six months ended June 30, 2021, net cash provided by financing activities of $197.1 million consisted primarily of proceeds of $187.2 million, after deducting underwriting discounts and commissions and other offering costs, from the March 2021 Offering, as well as proceeds received from issuance of common stock upon exercise of stock options of $9.6 million. Net cash used in financing activities includes $0.4 million of offering cost payments in connection with the March 2021 Offering and $0.2 million of debt issuance cost payments related to the Amended 2018 Credit Facility in June 2021.

During the six months ended June 30, 2020, net cash provided by financing activities of $25.7 million consisted of $25.0 million proceeds received from borrowings under a loan and security agreement and $0.7 million proceeds received from issuance of common stock upon exercise of stock options.

Loan and Security Agreement

In December 2018, or the Closing Date, we entered into a loan and security agreement, or the Loan Agreement, with SLR Investment Corp. (formerly Solar Capital Ltd.) as collateral agent for the lenders party thereto for an aggregate principal amount of $75.0 million, or the 2018 Credit Facility. The aggregate principal amount was funded in three tranches of term loans of $25.0 million each, on the Closing Date, in June 2019 and in June 2020.

On June 22, 2021, or the Amendment Closing Date, we entered into an amendment, or the Amendment, to our Loan Agreement, collectively and as amended in September 2019, the Amended 2018 Credit Facility. Pursuant to the Amendment, we and our lenders agreed to extend the interest-only period in respect of our borrowings under the Loan Agreement from December 21, 2021 until July 1, 2024. The parties also agreed to extend the final maturity date on which all of our outstanding obligations under the Loan Agreement become due to June 1, 2026 (from December 21, 2023 originally). An additional tranche in the amount of $35.0 million is available to us prior to the final maturity date, to be provided at the sole discretion of the lenders. Interest on the outstanding loan balance will accrue at a rate of 5.50%, plus the greater of 2.10% or the one-month U.S. LIBOR rate. Monthly principal payments will commence on July 1, 2024 and will be amortized over the following 24 months. Certain back-end fees are due to the lender at the time of final repayment based on the total funded term loans. The term loans are subject to a prepayment fee of 1.00% if prepayment occurs within the first year subsequent to the Amendment Closing Date, 0.50% in the second year and 0.25% in the third year through final maturity date.

The Loan Agreement contains financial covenants that require us to maintain either a certain minimum cash balance or a minimum market capitalization threshold. We were in compliance with all such financial covenants as of June 30, 2021. The Loan Agreement contains customary representations, warranties and covenants and also includes customary events of default, including payment defaults, breaches of covenants, change of control and a material adverse change default. Upon the occurrence of an event of default, a default interest rate of an additional 4.00% per annum may be applied to the outstanding loan balances, and the lenders may declare all outstanding obligations immediately due and payable. Borrowings under the Loan Agreement are collateralized by substantially all of our assets, other than our intellectual property.

Common Stock Sales Agreement

On August 1, 2019, we entered into a Distribution Agreement, the Distribution Agreement, with multiple sales agents, pursuant to which the Company may offer and sell to or through the agents, from time to time, shares of the Company's common stock, par value $0.001 per share, having an aggregate gross sales price of up to $100.0 million. Sales, if any, of the Company's shares of common stock will be made primarily in “at-the-market” offerings, as defined in Rule 415 under the Securities Act. The shares of common stock will be offered and sold pursuant to our registration statement on Form S-3 and a related prospectus supplement, both filed with the SEC on August 1, 2019. We intend to use substantially all of the net proceeds from any sale of shares of the Company's common stock for working capital and other general corporate purposes. There have been no shares of the Company's common stock sold under the Distribution Agreement as of June 30, 2021.

Funding Requirements

We expect our expenses to increase substantially in the future as we conduct the activities necessary to advance our product candidates through development. The timing and amount of our operating and capital expenditures will depend largely on:

- the timing and progress of preclinical and clinical development activities;

- the commencement, enrollment or results of the planned clinical trials of our product candidates or any future clinical trials we may conduct, or changes in the development status of our product candidates;
- the timing and outcome of regulatory review of our product candidates;
- the continued impact of the COVID-19 pandemic, including from any subsequent outbreak whether or not due to emerging variants thereof, on our operations;
- our decision to initiate a clinical trial, not to initiate a clinical trial or to terminate an existing clinical trial;
- changes in laws or regulations applicable to our product candidates, including but not limited to clinical trial requirements for approvals;
- developments concerning our key vendors;
- our ability to obtain materials to produce adequate product supply for any approved product or inability to do so at acceptable prices;
- the costs associated with the operation of our multi-suite manufacturing facility and the costs and timing of any future renovation or expansion of the facility;
- our ability to establish collaborations if needed;
- the costs and timing of future commercialization activities, including product manufacturing, marketing, sales and distribution, for any of our product candidates for which we obtain marketing approval;
- the legal patent costs involved in prosecuting patent applications and enforcing patent claims and other intellectual property claims;
- additions or departures of key scientific or management personnel;
- unanticipated serious safety concerns related to the use of our product candidates; and
- the terms and timing of any collaboration, license or other arrangement, including the terms and timing of any milestone payments thereunder.

We believe that our existing cash, cash equivalents and investments, will be sufficient to fund our operating expenses, capital expenditure requirements and debt service payments for at least 12 months from the issuance date of these condensed consolidated financial statements. We have based this estimate on assumptions that may prove to be wrong, and we could utilize our available capital resources sooner than we expect.

Until such time, if ever, as we can generate substantial product revenue, we expect to finance our operations through a combination of public and private equity financings, debt financings, collaborations, strategic alliances and marketing, distribution and licensing arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, investors' ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect investors' rights as a common stockholder. 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 acquisitions or capital expenditures or declaring dividends. 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 drug candidates, or grant licenses on terms that may not be favorable to us. If we are unable to obtain funding, we may need to delay, scale back or discontinue some or all of our research and development programs, product portfolio expansion or commercialization efforts, which could adversely affect our business prospects.

Contractual Obligations and Commitments

The following table summarizes our contractual obligations as of June 30, 2021 and the effects that such obligations are expected to have on our liquidity and cash flows in future periods:

	Payments Due by Period				
	Total	Less Than 1 Year	1 to 3 Years	4 to 5 Years	More Than 5 Years
			(in thousands)		
Operating lease commitments (1)	$ 49,605	$ 8,837	$ 14,888	$ 7,709	$ 18,171
Debt obligations (2)	99,036	5,700	11,400	81,936	—
Total	$ 148,641	$ 14,537	$ 26,288	$ 89,645	$ 18,171

(1) Amounts in table reflect payments due for our leases of office and laboratory space in Cambridge, Massachusetts under three operating lease agreements that expire in September 2021, January 2027 and August 2028.

(2) Amounts in table reflect the contractually required principal and interest payments payable under the Amended 2018 Credit Facility. For purposes of this table, the interest due under the Amended 2018 Credit Facility was calculated using an assumed interest rate of 8.84% per annum, which was the interest rate in effect as of June 30, 2021.

Critical Accounting Policies and Significant Judgments and Estimates

Our condensed consolidated financial statements are prepared in accordance with generally accepted accounting principles in the United States, or GAAP. The preparation of our condensed consolidated financial statements and related disclosures requires us to make estimates, assumptions and judgments that affect the reported amounts of assets, liabilities, revenue, costs and expenses, and related disclosures. Our critical accounting policies are described under the heading "Management's Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies and Significant Judgments and Estimates" in our Annual Report on Form 10-K for the year ended December 31, 2020, filed with the SEC on February 23, 2021. If actual results or events differ materially from the estimates, judgments and assumptions used by us in applying these policies, our reported financial condition and results of operations could be materially affected.

There have been no significant changes to our critical accounting policies from those described in our Annual Report on Form 10-K for the year ended December 31, 2020 filed with the SEC on February 23, 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.

Recently Issued Accounting Pronouncements

A description of recently issued accounting pronouncements that may potentially impact our financial position and results of operations is disclosed in Note 2 to our condensed consolidated financial statements appearing elsewhere in this Quarterly Report on Form 10-Q.

Emerging Growth Company Status

The Jumpstart Our Business Startups Act of 2012 permits an "emerging growth company" such as us to take advantage of an extended transition period to comply with new or revised accounting standards applicable to public companies until those standards would otherwise apply to private companies. We have elected not to "opt out" of such extended transition period, which means that when a standard is issued or revised and it has different application dates for public or private companies, we will adopt the new or revised standard at the time private companies adopt the new or revised standard and will do so until such time that we either (i) irrevocably elect to "opt out" of such extended transition period

or (ii) no longer qualify as an emerging growth company. While we have not made such an irrevocable election, we have not delayed the adoption of any applicable accounting standards.

As of June 30, 2021, we determined that we will become a large accelerated filer under the rules of the SEC and we will no longer be classified as an emerging growth company as of December 31, 2021.

Item 3. Quantitative and Qualitative Disclosures About Market Risk.

As of June 30, 2021, we had cash, cash equivalents and investments of $298.2 million, which consisted of cash, money market accounts, U.S. government money market funds, U.S. government treasury bills and U.S. government treasury notes. Interest income is sensitive to changes in the general level of interest rates; however, due to the nature of these investments, an immediate 10% change in interest rates would not have a material effect on the fair market value of our investment portfolio.

As of June 30, 2021, we had $75.0 million of borrowings outstanding under the Amended 2018 Credit Facility. Interest on the outstanding borrowings under the Amended 2018 Credit Facility accrues at a rate of 5.50%, plus the greater of 2.10% or the one-month U.S. LIBOR rate. An immediate 10% change in the one-month U.S. LIBOR rate would not have a material impact on our debt-related obligations, financial position or results of operations.

We are not currently exposed to significant market risk related to changes in foreign currency exchange rates; however, we have contracted with and may continue to contract with foreign vendors that are located in Europe, Australia and China. Our operations may be subject to fluctuations in foreign currency exchange rates in the future.

Inflation generally affects us by increasing our cost of labor. We do not believe that inflation had a material effect on our business, financial condition or results of operations during the six months ended June 30, 2021.

Item 4. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer (our principal executive officer and principal financial officer, respectively), evaluated the effectiveness of our disclosure controls and procedures as of June 30, 2021. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act, means controls and other procedures of an issuer that are designed to ensure that information required to be disclosed by an issuer 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 SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by the issuer in the reports that it files or submits under the Exchange Act is accumulated and communicated to the issuer’s management, including its principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and 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 Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) 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

We are not currently a party to any material legal proceedings.

Item 1A. Risk Factors

Our business is subject to numerous risks. You should carefully consider the risks described below, as well as the other information in this Quarterly Report on Form 10 Q, including our condensed consolidated financial statements and the related notes and "Management's discussion and analysis of financial condition and results of operations," and in our other filings with the Securities and Exchange Commission. The occurrence of any of the events or developments described below could harm our business, financial condition, results of operations and growth prospects. In such an event, the market price of our common stock could decline and you may lose all or part of your investment. Additional risks and uncertainties not presently known to us or that we currently deem immaterial also may impair our business operations.

Risks related to our financial condition and capital requirements

We have incurred net losses in every year since our inception and anticipate that we will continue to incur net losses in the future.

We are a clinical-stage biopharmaceutical company with a limited operating history. Investment in biopharmaceutical product development is highly speculative because it entails substantial upfront capital expenditures and significant risk that any potential product candidate will fail to demonstrate adequate effect or an acceptable safety profile, gain regulatory approval and become commercially viable. We have no products approved for commercial sale and have not generated any revenue from product sales to date, and we continue to incur significant research and development and other expenses related to our ongoing operations. As a result, we are not profitable and have incurred losses in each period since our inception in 2013. For the six months ended June 30, 2021 and 2020, we reported net losses of $92.5 million and $86.3 million, respectively. As of June 30, 2021, we had an accumulated deficit of $573.0 million. We expect to continue to incur significant losses for the foreseeable future, and we expect these losses to increase as we continue our research and development of, and seek regulatory approvals for, our product candidates. We anticipate that our expenses will increase substantially if, and as, we:

- conduct clinical trials for our product candidates and if we continue to experience delays, setbacks or disruptions to our preclinical studies, clinical trials or our clinical supply due to the ongoing COVID-19 pandemic, including from any subsequent outbreak whether or not due to emerging variants thereof;
- further develop our RED PLATFORM;
- continue to discover and develop additional product candidates;
- maintain, expand and protect our intellectual property portfolio;
- hire additional clinical, scientific, manufacturing and commercial personnel;
- expand in-house manufacturing capabilities, including through the renovation, customization and operation of our manufacturing facility;
- establish a commercial manufacturing source and secure supply chain capacity sufficient to provide commercial quantities of any product candidates for which we may obtain regulatory approval;
- acquire or in-license other product candidates and technologies;

- seek regulatory approvals for any product candidates that successfully complete clinical trials;
- establish a sales, marketing and distribution infrastructure to commercialize any products for which we may obtain regulatory approval; and
- add operational, regulatory, financial and management information systems and personnel, including personnel to support our product development and planned future commercialization efforts, as well as any additional infrastructure necessary to function as a public company.

To become and remain profitable, we or any potential future collaborator must develop and eventually commercialize products with significant market potential at an adequate profit margin after cost of goods sold and other expenses. This will require us to be successful in a range of challenging activities, including completing preclinical studies and clinical trials, obtaining marketing approval for product candidates, obtaining adequate reimbursement for product candidates, manufacturing, marketing and selling products for which we may obtain marketing approval and satisfying any post-marketing requirements. We may never succeed in any or all of these activities and, even if we do, we may never generate revenue that is significant or large enough to achieve profitability. If we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis. Our failure to become and remain profitable would decrease the value of our company and could impair our ability to raise capital, maintain our research and development efforts, expand our business or continue our operations. A decline in the value of our company also could cause our stockholders to lose all or part of their investment.

Even if we succeed in commercializing one or more of our product candidates, we will continue to incur substantial research and development and other expenditures to develop and market additional product candidates. We may encounter unforeseen expenses, difficulties, complications, delays and other unknown factors that may adversely affect our business. The size of our future net losses will depend, in part, on the rate of future growth of our expenses and our ability to generate revenue. Our prior losses and expected future losses have had and will continue to have an adverse effect on our stockholders' equity and working capital.

We will require additional capital to fund our operations and if we fail to obtain necessary financing, we will not be able to complete the development and commercialization of our product candidates.

Our operations have consumed substantial amounts of cash since inception. We expect to continue to spend substantial amounts to conduct further research and development and preclinical or nonclinical testing and studies and clinical trials of our current and future programs, to build a supply chain, including through operating our own manufacturing facility, to seek regulatory approvals for our product candidates and to launch and commercialize any products for which we receive regulatory approval, including potentially building our own commercial organization. As of June 30, 2021, we had $298.2 million of cash, cash equivalents and investments. Based on our current operating plan, we believe that our existing cash, cash equivalents and investments will be sufficient to fund our operating expenses, capital expenditure requirements, and debt service payments for at least 12 months from the issuance date of the condensed consolidated financial statements included herein. However, our future capital requirements and the period for which our existing resources will support our operations may vary significantly from what we expect, and we will in any event require additional capital in order to complete clinical development of any of our current programs. Our monthly spending levels will vary based on new and ongoing development and corporate activities. Because the length of time and activities associated with development of our product candidates is highly uncertain, we are unable to estimate the actual funds we will require for development and any approved marketing and commercialization activities. Our future funding requirements, both near and long-term, will depend on many factors, including, but not limited to:

- the initiation, progress, timing, costs and results of preclinical or nonclinical testing and studies and clinical trials for our product candidates;
- the clinical development plans we establish for our product candidates;
- the number and characteristics of product candidates that we develop or may in-license;

- the terms of any collaboration agreements we may choose to conclude;
- the outcome, timing and cost of meeting regulatory requirements established by the U.S. Food and Drug Administration, or FDA, the European Medicines Agency, or EMA, and other comparable foreign regulatory authorities;
- the cost of filing, prosecuting, defending and enforcing our patent claims and other intellectual property rights;
- the cost of defending intellectual property disputes, including patent infringement actions brought by third parties against us or our product candidates;
- the effect of competing technological and market developments;
- the costs of establishing and maintaining a supply chain for the development and manufacture of our product candidates;
- the cost and timing of establishing, expanding and scaling manufacturing capabilities; and
- the cost of establishing sales, marketing and distribution capabilities for any product candidates for which we may receive regulatory approval in regions where we choose to commercialize our products on our own.

Until we can generate sufficient product or royalty revenue to finance our cash requirements, which we may never do, we expect to finance our operations through a combination of public and private equity financings, debt financings, collaborations, strategic alliances and marketing, distribution and licensing arrangements. If we are unable to raise additional capital in sufficient amounts or on terms acceptable to us, we may have to significantly delay, scale back or discontinue the development or commercialization of one or more of our products or product candidates or one or more of our other research and development initiatives. Any of the above events could significantly harm our business, prospects, financial condition and results of operations and cause the price of our common stock to decline.

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

We may seek additional capital through a combination of public and private equity financings, debt financings, collaborations, strategic alliances and marketing, distribution and licensing arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, our stockholders' ownership interest will be diluted and the terms may include liquidation or other preferences that adversely affect their rights as a stockholder. The incurrence of additional indebtedness would result in increased fixed payment obligations and could involve certain restrictive covenants, such as limitations on our ability to incur additional debt or declare dividends, limitations on our ability to acquire or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business. If we raise additional funds through licensing, marketing or distribution arrangements or other collaborations or strategic alliances with third parties, we may have to relinquish valuable rights to our technologies or product candidates, future revenue streams or research programs or grant licenses on terms unfavorable to us. We also could be required to seek collaborators for one or more of our current or future product candidates at an earlier stage than otherwise would be desirable.

We have an effective shelf registration statement on Form S-3 (Registration No. 333-232955), or the S-3 Registration Statement, on file with the Securities and Exchange Commission, or the SEC, pursuant to which we may, from time to time, sell up to an aggregate of $250.0 million (as of June 30, 2021) of our common stock, preferred stock, debt securities, warrants or units. Future sales of securities under the S-3 Registration Statement could result in dilution of our stockholders and could have a negative impact on our stock price.

The terms of our debt facility place restrictions on our operating and financial flexibility, and failure to comply with covenants or to satisfy certain conditions of the agreement governing the debt facility may result in acceleration of our repayment obligations and foreclosure on our pledged assets, which could significantly harm our liquidity, financial condition, operating results, business and prospects and cause the price of our common stock to decline.

In December 2018, we entered into a loan and security agreement, or (as amended) the Loan Agreement, with SLR Investment Corp. (formerly Solar Capital Ltd.) as collateral agent for the lenders party thereto, or the Collateral Agent, that is secured by a lien covering substantially all of our assets, excluding intellectual property, but including proceeds from the sale, license, or disposition of our intellectual property, under which, as of June 30, 2021, we have borrowed $75.0 million.

The Loan Agreement requires us to comply with a number of covenants (affirmative and negative), including restrictive covenants that limit our ability to: incur additional indebtedness; encumber the collateral securing the loan; acquire, own or make investments; repurchase or redeem any class of stock or other equity interest; declare or pay any cash dividend or make a cash distribution on any class of stock or other equity interest; transfer a material portion of our assets; acquire other businesses; and merge or consolidate with or into any other organization or otherwise suffer a change in control, in each case subject to exceptions.

Although we extended the repayment date under the Loan Agreement to 2024 pursuant to the amendment to the Loan Agreement entered into in June 2021, there is no guarantee that we will have sufficient funds available to repay the amounts outstanding when due. If we default under the facility, the lenders may accelerate all of our repayment obligations and, if we are unable to access funds to meet those obligations or to renegotiate our agreement, the lenders could take control of our pledged assets and we may need to immediately cease operations. If we were to renegotiate our agreement under such circumstances, the terms may be significantly less favorable to us. If we were liquidated, the lender's right to repayment would be senior to the rights of our stockholders to receive any proceeds from the liquidation. Any declaration of the Collateral Agent of an event of default could significantly harm our liquidity, financial condition, operating results, business, and prospects and cause the price of our common stock to decline.

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

Unstable market and economic conditions may have serious adverse consequences on our business, financial condition and stock price.

As widely reported, global credit and financial markets have experienced extreme volatility and disruptions in the past several years, including severely diminished liquidity and credit availability, declines in consumer confidence, declines in economic growth, increases in unemployment rates and uncertainty about economic stability. There can be no assurance that deterioration in credit and financial markets and confidence in economic conditions will not occur. For example, since the beginning of January 2020, the coronavirus, or COVID-19, pandemic has caused disruption in the financial markets both globally and in the United States. While the negative effects of the COVID-19 pandemic appear to be lessening as vaccines have been distributed and continue to be distributed in the United States and elsewhere, numerous other countries have not developed, had available or distributed such vaccines at all or on widespread bases. Additionally, there have emerged numerous variants of the coronavirus, and there is a possibility that such variants will display resistance to the vaccines we currently have available. Given the inter-connectivity of the global economy, pandemic disease and health events have the potential to continue to negatively impact economic activities in many countries, including the United States. The ongoing spread of the coronavirus, including variants thereof and resurgences in geographies experiencing some relief, could have a negative material impact on our business, prospects, financial condition and results of operations of the Company.

In addition, our general business strategy may be adversely affected by any such economic downturn, volatile business environment or continued unpredictable and unstable market conditions. If the current equity and credit markets deteriorate, or do not improve, it may make any necessary debt or equity financing more difficult, more costly, and more

dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our growth strategy, financial performance and stock price and could require us to delay, scale back or abandon the development or commercialization of one or more of our product candidates or one or more of our other research and development initiatives. In addition, there is a risk that one or more of our current service providers, manufacturers or other partners may not survive these difficult economic times, which could directly affect our ability to attain our operating goals on schedule and on budget.

On June 23, 2016, the electorate in the United Kingdom voted in favor of leaving the European Union, commonly referred to as Brexit and the United Kingdom formally left the European Union on January 31, 2020. The transition period during which European Union pharmaceutical law remained applicable to the United Kingdom ended on December 31, 2020. The European Union and the United Kingdom have concluded a trade and cooperation agreement, or TCA, which was provisionally applicable since January 1, 2021 and has been formally applicable since May 1, 2021. The TCA includes specific provisions concerning pharmaceuticals, which include the mutual recognition of Good Manufacturing Practice, or GMP, inspections of manufacturing facilities for medicinal products and GMP documents issued, but does not foresee wholesale mutual recognition of United Kingdom and European Union pharmaceutical regulations. Since the regulatory framework in the United Kingdom covering quality, safety and efficacy of pharmaceutical products, clinical trials, marketing authorization, commercial sales and distribution of pharmaceutical products is derived from European Union directives and regulations, Brexit could materially impact the future regulatory regime which applies to drugs and the approval of drug candidates in the United Kingdom, now that the United Kingdom legislation has the potential to diverge from European Union legislation. It remains to be seen how Brexit will impact regulatory requirements for product candidates and products in the United Kingdom in the long-term. Given the lack of comparable precedent, it is unclear the extent of the financial, trade and legal implications that the withdrawal of the United Kingdom from the European Union will have and how such withdrawal will affect us. The long-term impact of Brexit, including on our business and our industry, will depend on how the terms of the TCA take effect in practice and any other agreements that are negotiated in relation to the United Kingdom's future relationship with the European Union. We continue to closely monitor the Brexit developments in order to determine, quantify and proactively address changes as they become clear.

For example, Brexit may result in the United Kingdom significantly altering its regulations affecting the clearance or approval of our drug candidates that are developed in the United Kingdom. Since the expiry of the transition period, Great Britain will no longer be covered by centralized marketing authorizations (under the Northern Irish Protocol, centralized marketing authorizations will continue to be recognized in Northern Ireland). For a period of two years from January 1, 2021, the Medicines and Healthcare products Regulatory Agency, or MHRA, the UK medicines regulator, may rely on a decision taken by the European Commission on the approval of a new marketing authorization in the centralized procedure, in order to more quickly grant a new Great Britain marketing authorization. A separate application will, however, still be required. Any new regulations in the future could add time and expense to the conduct of our business, as well as the process by which our drug candidates receive regulatory approval in the United Kingdom, the European Union and elsewhere. In addition, the announcement of Brexit and the withdrawal of the United Kingdom from the European Union have had and may continue to have a material adverse effect on global economic conditions and the stability of global financial markets, and may significantly reduce global market liquidity and restrict the ability of key market participants to operate in certain financial markets. Any of these effects of Brexit, among others, could adversely affect our business, our results of operations, liquidity and financial condition.

As of June 30, 2021, we had cash, cash equivalents and investments of $298.2 million. While we are not aware of any downgrades, material losses, or other significant deterioration in the fair value of our cash equivalents and investments since June 30, 2021, no assurance can be given that further deterioration of the global credit and financial markets would not negatively impact our current portfolio of cash equivalents or our ability to meet our financing objectives. Furthermore, our stock price may decline due in part to the volatility of the stock market and the general economic downturn.

Changes in tax law could adversely affect our business and financial condition.

The rules dealing with U.S. federal, state, and local income taxation are constantly under review by persons involved in the legislative process and by the Internal Revenue Service and the U.S. Treasury Department. Changes to tax laws

(which changes may have retroactive application) could adversely affect our business. In recent years, many such changes have been made and changes are likely to continue to occur in the future. Future changes in tax laws could have a material adverse effect on our business, cash flow, financial condition or results of operations. We urge investors to consult with their legal and tax advisers regarding the implications of potential changes in tax laws on an investment in our common stock.

The amount of and our ability to use net operating losses and research and development credits to offset future taxable income may be subject to certain limitations and uncertainty.

As of December 31, 2020, we had federal and state net operating loss, or NOL, carryforwards of $357.3 million and $360.1 million, respectively, which may be available to offset future taxable income. The federal NOLs include $37.2 million which expire at various dates through 2037 and $320.1 million which carryforward indefinitely. The state NOLs expire at various dates through 2040. As of December 31, 2020, we also had federal and state research and development tax credit carryforwards of $15.3 million and $9.0 million, respectively, which may be available to offset future tax liabilities and begin to expire in 2034 and 2026, respectively.

Federal NOLs generated in taxable years after December 31, 2017 generally may not be carried back to prior taxable years, and while such federal NOLs generated in taxable years beginning after December 31, 2017 will not be subject to expiration, the deduction for such NOL in any taxable year will be limited to 80% of our taxable income in such year, where taxable income is determined without regard to the NOL deduction itself. However, the Coronavirus Aid, Relief and Economic Security Act repeals the 80% limitation on the utilization of such federal NOLs generated in taxable years beginning after December 31, 2017 and beginning before January 1, 2021 and allows for federal NOLs generated in taxable years beginning after December 31, 2017 and before January 1, 2021 to be carried back to each of the five taxable years preceding the taxable year in which the loss arises. It is uncertain whether this change in law temporarily allowing for the carryback of federal NOLs will produce any material benefit for our business.

In addition, in general, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, or the Code, a corporation that undergoes an “ownership change” is subject to limitations on its ability to utilize its pre-change NOLs or tax credits, or NOLs or credits (including federal research and development tax credits), to offset future taxable income or taxes. For these purposes, an ownership change generally occurs where the aggregate stock ownership of one or more stockholders or groups of stockholders who owns at least 5% of a corporation’s stock increases its ownership by more than 50 percentage points over its lowest ownership percentage within a specified testing period. Our existing NOLs or credits may be subject to limitations arising from previous ownership changes, including in connection with our earlier private placements, IPO, our recent underwritten offering and other transactions. In addition, future changes in our stock ownership, many of which are outside of our control, could result in an ownership change under Sections 382 and 383 of the Code and limit our ability to utilize our NOLs and our credits. Our NOLs or credits may also be impaired under state law. Accordingly, we may not be able to utilize a material portion of our NOLs or credits. Furthermore, our ability to utilize our NOLs or credits is conditioned upon our attaining profitability and generating U.S. federal and state taxable income. As described above under this section captioned “Risk factors—Risks related to our financial condition and capital requirements,” we have incurred significant net losses since our inception and anticipate that we will continue to incur significant losses for the foreseeable future; and therefore, we do not know whether or when we will generate the U.S. federal or state taxable income necessary to utilize our NOLs or credits that are subject to limitation by Sections 382 and 383 of the Code.

Risks related to future performance

We have a limited operating history, which may make it difficult to evaluate our technology and product development capabilities and predict our future performance.

We are early in our development efforts with our lead oncology product candidate, RTX-240, and our lead aAPC therapy product candidate, RTX-321, each in Phase 1 clinical trials. We were formed in 2013, have no products approved for commercial sale and have not generated any revenue from product sales. Our ability to generate product revenue or profits, which we do not expect will occur for many years, if ever, will depend on the successful development

and eventual commercialization of our product candidates, which may never occur. We may never be able to develop or commercialize a marketable product.

All of our programs require additional preclinical research and development, clinical development, regulatory approval in multiple jurisdictions, obtaining manufacturing supply, capacity and expertise, building of a commercial organization, substantial investment and significant marketing efforts before we generate any revenue from product sales. In addition, our product candidates must be approved for marketing by the FDA or certain other health regulatory agencies, such as the EMA, before we may commercialize any product.

Our limited operating history, particularly in light of the rapidly evolving cellular therapeutics field, may make it difficult to evaluate our technology and industry and predict our future performance. Our short history as an operating company makes any assessment of our future success or viability subject to significant uncertainty. We will encounter risks and difficulties frequently experienced by early-stage companies in rapidly evolving fields. If we do not address these risks successfully, our business will suffer. Similarly, we expect that our financial condition and operating results will fluctuate significantly from quarter to quarter and year to year due to a variety of factors, many of which are beyond our control. As a result, our shareholders should not rely upon the results of any quarterly or annual period as an indicator of future operating performance.

In addition, as an early-stage company, we have encountered unforeseen expenses, difficulties, complications, delays and other known and unknown circumstances, including most recently in connection with the discontinuation of our Phase 1b clinical trial for RTX-134. As we advance our product candidates, we will need to transition from a company with a research focus to a company capable of supporting clinical development and if successful, commercial activities. We may not be successful in such a transition.

Our business is highly dependent on the success of our initial product candidates targeting cancer and autoimmune diseases. All of our product candidates will require significant additional nonclinical and clinical development before we can seek regulatory approval for and launch a product commercially.

Our business and future success depends on our ability to obtain regulatory approval of and then successfully launch and commercialize our initial product candidates targeting cancer and autoimmune diseases, including RTX-240, RTX-321 and others that may be selected from our preclinical programs. We are currently dosing patients in the ongoing Phase 1/2 trial of RTX-240 in advanced solid tumors (including the Phase 1 arm of RTX-240 in combination with pembrolizumab), the Phase 1 trial of RTX-240 in relapsed/refractory AML and the Phase 1 trial of RTX-321 for the treatment of advanced human papillomavirus, or HPV, 16-positive cancers. However, we may experience delays or setbacks in advancing these product candidates. In particular, RTX-240 and RTX-321, as our first oncology clinical programs, may experience preliminary complications surrounding trial execution, such as complexities surrounding trial design, establishing trial protocols and interpretability of results, clinical site access and initiation, patient recruitment and enrollment, quality and supply of clinical doses, safety issues, or a lack of clinically relevant activity. For example, we encountered manufacturing and enrollment challenges in connection with our Phase 1b clinical trial for our discontinued product candidate, RTX-134.

All of our product candidates are in the early stages of development and will require additional nonclinical and clinical development, regulatory review and approval in multiple jurisdictions, substantial investment, access to sufficient commercial manufacturing capacity and significant marketing efforts before we can generate any revenue from product sales. In addition, because RTX-240 and RTX-321 are our most advanced current product candidates, if RTX-240 or RTX-321 encounters safety, efficacy, supply or manufacturing problems, developmental or unexpected delays, regulatory or commercialization issues or other problems, our development plans and business would be significantly harmed.

The successful development of cellular therapeutics, such as our investigational RCTs, is highly uncertain.

Successful development of cellular therapeutics, such as our RCTs, is highly uncertain and is dependent on numerous factors, many of which are beyond our control. Cellular therapeutics that appear promising in the early phases of development may fail to reach the market for several reasons, including:

- nonclinical or preclinical testing or study results may show our RCTs to be less effective than desired or to have harmful or problematic side effects or toxicities;

- clinical trial results may show our RCTs to be less effective than expected (e.g., a clinical trial could fail to meet its primary endpoint(s)) or to have unacceptable side effects or toxicities;

- clinical trial results may show that our RCTs may not have the circulating time we expect based on preclinical studies and models, which may negatively affect the activity observed in clinical trials;

- failure to receive the necessary regulatory approvals or a delay in receiving such approvals, including delays resulting from slow enrollment in clinical trials, manufacturing disruptions, patients dropping out of trials, length of time to achieve trial endpoints, additional time requirements for data analysis, biologics license application, or BLA, preparation, discussions with the FDA, an FDA request for additional nonclinical or clinical data, including bridging studies, or unexpected safety or manufacturing issues;

- manufacturing issues and costs, formulation issues, dosage requirements, pricing or reimbursement issues, or other factors that make our RCT therapies uneconomical; and

- proprietary rights of others and their competing products and technologies that may prevent our RCT therapies from being commercialized.

The length of time necessary to complete clinical trials and to submit an application for marketing approval for a final decision by a regulatory authority may be difficult to predict for cellular therapies, in large part because of the limited regulatory history.

Even if we are successful in obtaining market approval, commercial success of any approved products will also depend in large part on the availability of insurance coverage and adequate reimbursement from third-party payors, including government payors, such as the Medicare and Medicaid programs, and managed care organizations, which may be affected by existing and future healthcare reform measures designed to reduce the cost of healthcare. Even if coverage is provided, the approved reimbursement amount may not be high enough to allow us to establish or maintain pricing sufficient to realize a sufficient return on our investment. Government authorities and third-party payors may decide which medications to pay for and establish their own reimbursement levels, limit the definition of the target treatment population to one smaller than that implied in the label granted by regulatory authorities, and could require us to conduct additional studies, including post-marketing studies related to the cost-effectiveness of a product, to qualify for reimbursement, which could be costly and divert our resources. If government and other healthcare payors were not to provide adequate insurance coverage and reimbursement levels for one any of our products once approved, market acceptance and commercial success would be reduced.

In addition, if any of our products are approved for marketing, we will be subject to significant regulatory obligations regarding the submission of safety and other post-marketing information and reports and registration, and will need to continue to comply (or ensure that our third-party providers comply) with current good manufacturing practices, or cGMPs, and good clinical practices, or GCPs, for any clinical trials that we conduct post-approval. In addition, there is always the risk that we or a regulatory authority might identify previously unknown problems with a product post-approval, such as adverse events of unanticipated severity or frequency. Compliance with these requirements is costly and any failure to comply or other issues with our product candidates post-approval could have a material adverse effect on our business, financial condition and results of operations.

Our RCT product candidates are based on a new technology, which makes it difficult to predict the time and cost of development and of subsequently obtaining regulatory approval, if at all.

Our RCT technology is relatively new and no products based on genetically engineered red blood cells have been approved to date in the United States or the European Union. As such, it is difficult to accurately predict the developmental challenges we may incur for our product candidates as they proceed through product discovery or

identification, preclinical studies and clinical trials. In addition, because we have not completed clinical trials, we have not yet been able to meaningfully assess safety in humans, and there may be short-term or long-term effects from treatment with any product candidates that we develop that we cannot predict at this time. Also, animal models may not exist for some of the diseases we choose to pursue in our programs. Furthermore, cellular therapies, such as our RCT product candidates, have a limited circulating time in animals as they are recognized as foreign by the host animal and therefore cleared by the complement-mediated reticuloendothelial system, which limits the safety and toxicology assessments that we can conduct in preclinical species. As a result of these factors, it is more difficult for us to predict the time and cost of product candidate development, and we cannot predict whether the application of our RED PLATFORM, or any similar or competitive cellular technologies, will result in the identification, development, and regulatory approval of any products. There can be no assurance that any development problems we experience in the future related to our RED PLATFORM or any of our research programs will not cause significant delays or unanticipated costs, or that such development problems can be solved. Any of these factors may prevent us from completing our preclinical studies or any clinical trials that we have initiated or may in the future initiate or commercializing any product candidates we may develop on a timely or profitable basis, if at all.

The clinical trial requirements of the FDA, the EMA and other regulatory authorities 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 product candidate. No products based on genetically engineered red blood cells have been approved to date by regulators. As a result, the regulatory approval process for product candidates such as ours is uncertain and may be more expensive and take longer than the approval process for product candidates based on other, better known or more extensively studied technologies. It is 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 the European Union or other regions of the world or how long it will take to commercialize our product candidates. Delay or failure to obtain, or unexpected costs in obtaining, the regulatory approval necessary to bring a potential product candidate to market could decrease our ability to generate sufficient product revenue, and our business, financial condition, results of operations and prospects may be harmed.

Our operating results may fluctuate significantly, which makes our future operating results difficult to predict and could cause our operating results to fall below expectations or our guidance.

Our quarterly and annual operating results may fluctuate significantly in the future, which makes it difficult for us to predict our future operating results. From time to time, we may enter into license or collaboration agreements with other companies that include development funding and significant upfront and milestone payments and/or royalties, which may become an important source of our revenue. Accordingly, our revenue may depend on development funding and the achievement of development and clinical milestones under any potential future license and collaboration agreements and sales of our products, if approved. These upfront and milestone payments may vary significantly from period to period and any such variance could cause a significant fluctuation in our operating results from one period to the next.

In addition, we measure compensation cost for stock-based awards made to employees, directors and non-employee consultants based on the fair value of the award on either the grant date or service completion date, and we recognize the cost as an expense over the recipient’s service period. Because the variables that we use as a basis for valuing stock-based awards change over time, including our underlying stock price and stock price volatility, the magnitude of the expense that we must recognize may vary significantly.

Furthermore, our operating results may fluctuate due to a variety of other factors, many of which are outside of our control and may be difficult to predict, including the following:

- the timing and cost of, and level of investment in, research and development activities relating to our current and any future product candidates, which will change from time to time;

- our ability to enroll patients in clinical trials and the timing of enrollment;

- the cost of manufacturing our current and any future product candidates, which may vary depending on FDA guidelines and requirements, the quantity of production and the terms of our agreements with any third-party manufacturers we may engage;
- the costs associated with our plans to renovate, customize and operate the manufacturing facility we own may be greater than we anticipate;
- expenditures that we may incur to acquire or develop additional product candidates and technologies;
- the timing and outcomes of clinical trials for our current product candidates and any other future product candidates or competing product candidates;
- competition from existing and potential future products that compete with our current product candidates and any other future product candidates, and changes in the competitive landscape of our industry, including consolidation among our competitors or partners;
- any delays in regulatory review or approval of our current product candidates or any other future product candidates;
- the level of demand for our current product candidates and any other future product candidates, if approved, which may fluctuate significantly and be difficult to predict;
- the risk/benefit profile, cost and reimbursement policies with respect to our products candidates, if approved, and existing and potential future products that compete with our current product candidates and any other future product candidates;
- our ability to commercialize our current product candidates and any other future product candidates, if approved, inside and outside of the United States, either independently or working with third parties;
- our ability to adequately support future growth;
- potential unforeseen business disruptions that increase our costs or expenses;
- future accounting pronouncements or changes in our accounting policies; and
- the changing and volatile global economic environment.

The cumulative effect of these factors could result in large fluctuations and unpredictability in our quarterly and annual operating results. As a result, comparing our operating results on a period-to-period basis may not be meaningful. Investors should not rely on our past results as an indication of our future performance. This variability and unpredictability could also result in our failing to meet the expectations of industry or financial analysts or investors for any period. If our revenue or operating results fall below the expectations of analysts or investors or below any forecasts we may provide to the market, or if the forecasts we provide to the market are below the expectations of analysts or investors, the price of our common stock could decline substantially. Such a stock price decline could occur even when we have met any previously publicly stated revenue and/or earnings guidance we may provide.

Risks related to product development and clinical trials

The FDA, the EMA and other regulatory authorities may implement additional regulations or restrictions on the development and commercialization of our product candidates, which may be difficult to predict.

The FDA, the EMA and regulatory authorities in other countries have each expressed interest in further regulating biotechnology products, such as cellular therapies. Agencies at both the federal and state level in the United States, as

well as the U.S. Congressional committees and other governments or governing agencies, have also expressed interest in further regulating the biotechnology industry. Such action may delay or prevent commercialization of some or all of our product candidates. Adverse developments in clinical trials of cellular therapy products conducted by others may cause the FDA or other oversight bodies to change the requirements for approval of any of our product candidates. Similarly, the EMA governs the development of cellular therapies in the European Union and may issue new guidelines concerning the development and marketing authorization for cellular therapy products and require that we comply with these new guidelines. These regulatory review agencies and committees and the new requirements or guidelines they promulgate may lengthen the regulatory review process, require us to perform additional studies or trials, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of our product candidates or lead to significant post-approval limitations or restrictions. As we advance our product candidates, we will be required to consult with these regulatory agencies and comply with applicable requirements and guidelines. If we fail to do so, we may be required to delay or discontinue development of such product candidates. These additional processes may result in a review and approval process that is longer than we otherwise would have expected. Regulatory authorities in different jurisdictions do not always agree on required nonclinical or clinical data or other requirements for product development and approval and may provide contradictory guidance, thus potentially further complicating or delaying product development or approval. Continued delays as a result of impacts from the COVID-19 pandemic and as a result of emerging variants of the coronavirus, including any impacts to our clinical supply chain, an increased or lengthier regulatory approval process or further restrictions on the development of our product candidates can be costly and could negatively impact our ability to complete clinical trials and commercialize our current and future product candidates in a timely manner, if at all.

Clinical development involves a lengthy and expensive process, with an uncertain outcome. We may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of any product candidates.

To obtain the requisite regulatory approvals to commercialize any product candidates, we must demonstrate through extensive preclinical studies and clinical trials that our products are safe and effective in humans. Clinical testing is expensive, difficult to design and implement and can take many years to complete, and its outcome is inherently uncertain. We may be unable to establish clinical endpoints that applicable regulatory authorities would consider clinically meaningful, and a clinical trial can fail at any stage of testing. The outcome of nonclinical studies and early clinical trials may not be predictive of the success of later clinical trials, and interim results of a clinical trial do not necessarily predict final results. Differences in trial design between early-stage clinical trials and later-stage clinical trials make it difficult to extrapolate the results of earlier clinical trials to later clinical trials. Moreover, nonclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in nonclinical studies and clinical trials have nonetheless failed to obtain marketing approval of their products.

Successful completion of clinical trials is a prerequisite to submitting a BLA to the FDA, a marketing authorization application, or MAA, to the EMA, and similar marketing applications to comparable foreign regulatory authorities, for each product candidate and, consequently, the ultimate approval and commercial marketing of any product candidates. We do not know whether any of our clinical trials will begin or, once begun, will be completed on schedule, if at all.

We may experience delays in completing our preclinical or nonclinical testing and studies and initiating or completing clinical trials. We also may experience numerous unforeseen events that could delay or prevent our ability to initiate or complete our clinical trials or receive marketing approval or commercialize our product candidates, including:

- we may be unable to generate sufficient preclinical, toxicology, or other *in vivo* or *in vitro* data to support the initiation of clinical trials;

- regulators or institutional review boards, or IRBs, or ethics committees may not authorize us or our investigators to commence a clinical trial or conduct a clinical trial at a prospective trial site;

- we may experience delays in reaching, or fail to reach, agreement on acceptable terms with prospective trial sites and prospective contract research organizations, or CROs, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;

- clinical trials of any product candidates may fail to show safety, purity or potency, or produce negative or inconclusive results and we may decide, or regulators may require us, to conduct additional nonclinical studies or clinical trials, such as bridging studies, or revise our trial design or testing protocols, which could adversely affect the approvability and commercial viability of our product candidates, or we may decide to abandon product development programs;

- the number of patients required for clinical trials of any product candidates may be larger than we anticipate, enrollment in these clinical trials may be slower than we anticipate, as was the case in our Phase 1b trial for our discontinued product candidate, RTX-134, or participants may drop out of these clinical trials or fail to return for post-treatment follow-up at a higher rate than we anticipate, and patient enrollment and participation may continue to be affected by the ongoing COVID-19 pandemic;

- we may need to add new or additional clinical trial sites;

- our third-party contractors may fail to comply with regulatory requirements or meet their contractual obligations to us in a timely manner, or at all, or may deviate from the clinical trial protocol or drop out of the trial, which may require that we add new clinical trial sites or investigators;

- the cost of preclinical or nonclinical testing and studies and clinical trials of any product candidates may be greater than we anticipate or greater than our available financial resources;

- the supply or quality of our product candidates or other materials necessary to conduct clinical trials of our product candidates may be untimely, insufficient or inadequate or may experience interruptions or delays, including on account of the ongoing COVID-19 pandemic and the U.S. government's utilization of its Defense Production Act authorities and the resulting impact on the biologic supply chain;

- RCTs may circulate longer or shorter in humans than anticipated;

- our product candidates may have undesirable side effects or other unexpected characteristics, causing us or our investigators, regulators or IRBs or ethics committees to suspend or terminate the trials, or reports may arise from preclinical or clinical testing of other therapies for cancer and autoimmune diseases or additional diseases that we target that raise safety or efficacy concerns about our product candidates;

- unforeseen global instability, including political instability or instability from an outbreak of pandemic or contagious disease, such as COVID-19 and variants thereof, in or around the cities and countries in which we conduct our clinical trials or where our third-party contractors operate; and

- the FDA or other regulatory authorities may require us to submit additional data, such as long-term toxicology studies, or impose other requirements before permitting us to initiate a clinical trial and, as seen with gene therapies, could impose long-term safety follow-up for any of our clinical trials.

We could also encounter delays if a clinical trial is suspended or terminated by us, the IRBs of the institutions in which such trials are being conducted, or the FDA or other regulatory authorities, or recommended for suspension or termination by the Data Safety Monitoring Board, or DSMB, for such trial. A suspension or termination may be imposed due to a number of factors, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or trial site by the FDA or other regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues or adverse side effects, failure to demonstrate a benefit from using a product or treatment, failure to establish or achieve clinically meaningful trial endpoints, changes in governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial. Many of the

factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates. Further, the FDA or other regulatory authorities may disagree with our clinical trial design and our interpretation of data from clinical trials or may change the requirements for approval even after they have reviewed and commented on the design for our clinical trials.

Additionally, some of the clinical trials we conduct may be open-label in study design and may be conducted at a limited number of clinical sites on a limited number of patients. An "open-label" clinical trial is one where both the patient and investigator know whether the patient is receiving the investigational product candidate or either an existing approved drug or placebo. Most typically, open-label clinical trials test only the investigational product candidate and sometimes may do so at different dose levels. Open-label clinical trials are subject to various limitations that may exaggerate any therapeutic effect as patients in open-label clinical trials are aware when they are receiving treatment. Open-label clinical trials may be subject to a "patient bias" where patients perceive their symptoms to have improved merely due to their awareness of receiving an experimental treatment. Moreover, patients selected for early clinical studies often include the most severe sufferers and their symptoms may have been bound to improve notwithstanding the new treatment. In addition, open-label clinical trials may be subject to an "investigator bias" where those assessing and reviewing the physiological outcomes of the clinical trials are aware of which patients have received treatment and may interpret the information of the treated group more favorably given this knowledge. Given that our studies of both RTX-240 and RTX-321 include an open-label dosing design, the results from these clinical trials may not be predictive of future clinical trial results with these or other product candidates for which we conduct an open-label clinical trial when studied in a controlled environment with a placebo or active control.

Our product development costs will increase if we experience delays in clinical testing or marketing approvals. We do not know whether any of our preclinical or nonclinical testing and studies or clinical trials will begin as planned, will need to be restructured or will be completed on schedule, or at all. Significant preclinical or nonclinical testing and studies or clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize our product candidates and may allow our competitors to bring products to market before we do, potentially impairing our ability to successfully commercialize our product candidates and harming our business and results of operations. Any delays in our nonclinical or future clinical development programs may harm our business, financial condition and prospects significantly.

Preclinical development is uncertain. Our preclinical programs may experience delays or may never advance to clinical trials, which would adversely affect our ability to obtain regulatory approvals or commercialize these programs on a timely basis or at all, which would have an adverse effect on our business.

All but two of our current product candidates are still in the preclinical stage, and their risk of failure is high. Before we can commence clinical trials for a product candidate, we must complete extensive preclinical testing and studies that support our planned INDs in the United States, or similar applications in other jurisdictions. We cannot be certain of the timely completion or outcome of our preclinical testing and studies and cannot predict if the FDA or other regulatory authorities will accept our proposed clinical programs or if the outcome of our preclinical testing and studies will ultimately support the further development of our programs. As a result, we cannot be sure that we will be able to submit INDs or similar applications for our preclinical programs on the timelines we expect, if at all, and we cannot be sure that submission of INDs or similar applications will result in the FDA or other regulatory authorities allowing clinical trials to begin.

Our ongoing and planned clinical trials or those of our future collaborators may reveal significant adverse events not seen in our preclinical or nonclinical studies and may result in a safety profile that could inhibit regulatory approval or market acceptance of any of our product candidates.

Before obtaining regulatory approvals for the commercial sale of any products, we must demonstrate through lengthy, complex and expensive preclinical studies and clinical trials that our product candidates are both safe and effective for use in each target indication. Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process. The results of preclinical studies and early clinical trials of our product candidates may not be predictive of the results of later-stage clinical trials. In addition, initial success in clinical trials may not be indicative of results obtained when such trials are completed. There is

typically an extremely high rate of attrition from the failure of product candidates proceeding through clinical trials. Our RCTs are produced from O negative donor blood stem cells and we believe can therefore be used as allogeneic therapies in approximately 95% of patients. However, following repeated dosing, some patients may develop antibodies to blood antigens on our RCTs. These antibodies could reduce the efficacy of our RCTs or result in undesirable side effects. Product candidates in later stages of clinical trials also may fail to show the desired safety and efficacy profile despite having progressed through nonclinical studies and initial clinical trials. A number of companies in the biopharmaceutical industry have suffered significant setbacks in advanced clinical trials due to lack of efficacy or unacceptable safety issues, notwithstanding promising results in earlier trials. Most product candidates that commence clinical trials are never approved as products and there can be no assurance that any of our current or future clinical trials will ultimately be successful or support further clinical development of any of our product candidates.

We intend to develop RTX-240 and RTX-321, and may develop future product candidates, alone and in combination with one or more cancer therapies. The uncertainty resulting from the use of our product candidates in combination with other cancer therapies may make it difficult to accurately predict side effects in future clinical trials.

If significant adverse events or other side effects are observed in any of our current or future clinical trials, we may have difficulty recruiting patients to our clinical trials, patients may drop out of our trials, or we may be required to abandon the trials or our development efforts of one or more product candidates altogether. Although our RCTs are designed to be enucleated, a small percentage of cells in our product candidates may retain nuclei, which could result in unexpected or undesirable side effects. We, the FDA or other applicable regulatory authorities, or an IRB may suspend clinical trials of a product candidate at any time for various reasons, including a belief that subjects in such trials are being exposed to unacceptable health risks or adverse side effects. Some potential therapeutics developed in the biotechnology industry that initially showed therapeutic promise in early-stage trials have later been found to cause side effects that prevented their further development. Even if the side effects do not preclude the drug from obtaining or maintaining marketing approval, undesirable side effects may inhibit market acceptance of the approved product due to its tolerability versus other therapies. Any of these developments could materially harm our business, financial condition and prospects.

Positive results from early preclinical studies or early clinical trials of our product candidates are not necessarily predictive of the results of later preclinical studies or any future clinical trials of our product candidates. If we cannot replicate the positive results from our earlier preclinical studies or earlier clinical trials in our later preclinical studies or future clinical trials, we may be unable to successfully develop, obtain regulatory approval for and commercialize our product candidates.

Any positive results from our preclinical studies or early clinical trials of our product candidates may not necessarily be predictive of the results from required later preclinical studies of future clinical trials. Similarly, even if we are able to complete our ongoing or planned preclinical studies or clinical trials according to our current development timeline, the positive results from such preclinical studies or clinical trials may not be replicated in subsequent preclinical studies or clinical trial results.

Many companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in late-stage clinical trials after achieving positive results in early-stage development and we cannot be certain that we will not face similar setbacks. These setbacks have been caused by, among other things, preclinical and other nonclinical findings made while clinical trials were underway, or safety or efficacy observations made in preclinical studies and clinical trials, including previously unreported adverse events. Moreover, preclinical, nonclinical and clinical data are often susceptible to varying interpretations and analyses and many companies that believed their product candidates performed satisfactorily in preclinical studies and clinical trials nonetheless failed to obtain FDA or EMA approval.

If we encounter difficulties enrolling patients in our clinical trials, our clinical development activities could be delayed or otherwise adversely affected.

We may experience difficulties in patient enrollment in our clinical trials for a variety of reasons. The timely completion of clinical trials in accordance with their protocols depends, among other things, on our ability to enroll a sufficient number of patients who remain in the study until its conclusion. The enrollment of patients depends on many factors, including:

- the severity of the disease under investigation;
- the patient eligibility and exclusion criteria defined in the protocol;
- clinical development programs in the same patient population, resulting in competition for clinical trial enrollment;
- the size of the patient population required for analysis of the trial's primary endpoints;
- the proximity of patients to trial sites, and the ability or willingness of patients to travel to trial sites during the ongoing COVID-19 pandemic;
- the design of the trial;
- our ability to recruit clinical trial investigators with the appropriate competencies and experience, and the availability of qualified investigators to conduct clinical trials during the ongoing COVID-19 pandemic;
- clinicians' and patients' perceptions as to the potential advantages and risks of the product candidate being studied in relation to other available therapies, including any new drugs that may be in clinical development or approved for the indications we are investigating;
- the efforts to facilitate timely enrollment in clinical trials;
- the patient referral practices of physicians;
- the ability to monitor patients adequately during and after treatment;
- the availability of adequate supply or quality of our product candidates or other materials necessary to conduct clinical trials, including as a result of the COVID-19 pandemic;
- our ability to obtain and maintain patient consents; and
- the risk that patients enrolled in clinical trials will drop out of the trials before completion.

In addition, our clinical trials will compete with other clinical trials of product candidates that are in the same therapeutic areas as our product candidates, and this competition will reduce the number and types of patients available to us, because some patients who might have opted to enroll in our trials may instead opt to enroll in a trial being conducted by one of our competitors. For example, over the last few months, we have experienced patient enrollment challenges in our Phase 1 clinical trial of RTX-321, likely as a result of the impacts of COVID-19 on site activation, alongside more competition for patients. Although the overall impact has been minimal, if competition in the patient population continues to increase, including as a result of prolonged impacts from the COVID-19 pandemic, our clinical trial timing could be delayed. Since the number of qualified clinical investigators is limited, we expect to conduct some of our clinical trials at the same clinical trial sites that some of our competitors use, which will reduce the number of patients who are available for our clinical trials in such clinical trial site. Moreover, because our product candidates represent a departure from more commonly used methods for our targeted therapeutic areas, potential patients and their doctors may be inclined to use conventional or newly launched competitive therapies, rather than enroll patients in any future clinical trial.

Delays in patient enrollment may result in increased costs or may affect the timing or outcome of our planned clinical trials, which could prevent completion of these trials and adversely affect our ability to advance the development of our product candidates.

Interim, top-line and preliminary data from our clinical trials that we announce or publish from time to time may change as more patient data become available and are subject to audit and verification procedures that could result in material changes in the final data.

From time to time, we may publish interim, top-line or preliminary data from our clinical trials. Interim data from clinical trials that we may complete are subject to the risk that one or more of the clinical outcomes may materially change as patient enrollment continues and more patient data become available. Preliminary or top-line data also remain subject to audit and verification procedures that may result in the final data being materially different from the preliminary data we previously published. As a result, interim and preliminary data should be viewed with caution until the final data are available. Adverse differences between preliminary or interim data and final data could significantly harm our business prospects.

We expect to develop RTX-240 and RTX-321, and potentially future product candidates, alone and in combination with other therapies, and safety or supply issues with combination-use products may delay or prevent development and approval of our product candidates.

We intend to develop RTX-240 and RTX-321, and likely other product candidates, alone and in combination with one or more cancer therapies, both approved and unapproved. Even if any product candidate we develop were to receive marketing approval or be commercialized for use in combination with other existing therapies, we would continue to be subject to the risks that the FDA or similar regulatory authorities outside of the United States could revoke approval of the therapy used in combination with our product candidate or that safety, efficacy, manufacturing or supply issues could arise with these existing therapies. Combination therapies are commonly used for the treatment of cancer, and we would be subject to similar risks if we develop any of our product candidates for use in combination with other drugs or for indications other than cancer. Similarly, if the therapies we use in combination with our product candidates are replaced as the standard of care for the indications we choose for any of our product candidates, the FDA or similar regulatory authorities outside of the United States may require us to conduct additional clinical trials. The occurrence of any of these risks could result in our own products, if approved, being removed from the market or being less successful commercially.

We may also evaluate RTX-240 and RTX-321 or any other future product candidates in combination with one or more cancer therapies that have not yet been approved for marketing by the FDA or similar regulatory authorities outside of the United States. We will not be able to market and sell RTX-240, RTX-321 or any product candidate we develop in combination with any such unapproved cancer therapies that do not ultimately obtain marketing approval. The regulations prohibiting the promotion of products for unapproved uses are complex and subject to substantial interpretation by the FDA and other government agencies. In addition, there are additional risks similar to the ones described for our products currently in development and clinical trials that result from the fact that such cancer therapies are unapproved, such as the potential for serious adverse effects, delay in their clinical trials and lack of FDA approval.

If the FDA or similar regulatory authorities outside of the United States do not approve these other drugs or revoke their approval of, or if safety, efficacy, manufacturing, or supply issues arise with, the drugs we choose to evaluate in combination with RTX-240, RTX-321 or any product candidate we develop, we may be unable to obtain approval of or market RTX-240, RTX-321 or any product candidate we develop.

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

Because we have limited financial and managerial resources, we intend to focus on developing product candidates for specific indications that we identify as most likely to succeed, in terms of both their potential for regulatory approval and commercialization. As a result, we may forego or delay pursuit of opportunities with other product candidates, as we did in the past for RTX-134, or for other indications that may prove to have greater commercial potential.

Our resource allocation decisions may cause us to fail to capitalize on viable commercial drugs or profitable market opportunities. Our spending on current and future research and development programs and product candidates for

specific indications may not yield any commercially viable product candidates. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to the product candidate.

We may not be successful in our efforts to identify additional product candidates. Due to our limited resources and access to capital, we must prioritize development of certain product candidates, which may prove to be wrong and may adversely affect our business.

Although we intend to explore other therapeutic opportunities, in addition to the product candidates that we are currently developing, we may fail to identify viable new product candidates for clinical development for a number of reasons. If we fail to identify additional potential product candidates, our business could be materially harmed.

Research programs to pursue the development of our existing and planned product candidates for additional indications and to identify new product candidates and disease targets require substantial technical, financial and human resources whether or not they are ultimately successful. Our research programs may initially show promise in identifying potential indications and/or product candidates, yet fail to yield results for clinical development for a number of reasons, including:

- the research methodology used may not be successful in identifying potential indications and/or product candidates;
- potential product candidates may, after further study, be shown to have harmful adverse effects or other characteristics that indicate they are unlikely to be effective drugs; or
- it may take greater human and financial resources than we will possess to identify additional therapeutic opportunities for our product candidates or to develop suitable potential product candidates through internal research programs, thereby limiting our ability to develop, diversify and expand our product portfolio.

Because we have limited financial and human resources, we intend to initially focus on research programs and product candidates for a limited set of indications. As a result, we may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential or a greater likelihood of success. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities.

Accordingly, there can be no assurance that we will ever be able to identify additional therapeutic opportunities for our product candidates or to develop suitable potential product candidates through internal research programs, which could materially adversely affect our future growth and prospects. We may focus our efforts and resources on potential product candidates or other potential programs that ultimately prove to be unsuccessful.

If we fail to develop additional product candidates, our commercial opportunity will be limited.

Developing and obtaining regulatory approval for and commercializing any additional product candidates we identify will require substantial additional funding beyond the net proceeds from our IPO completed in July 2018 and our underwritten offering completed in March 2021 and is prone to the risks of failure inherent in medical product development. We cannot provide you any assurance that we will be able to successfully advance additional product candidates, if any, through the development process.

Even if we receive FDA approval to market additional product candidates for the treatment of the diseases we target, we cannot assure our stockholders that any such product candidates will be successfully commercialized, widely accepted in the marketplace or more effective than other commercially available alternatives. If we are unable to successfully develop and commercialize additional product candidates, our commercial opportunity will be limited. Moreover, a failure in obtaining regulatory approval of additional product candidates may have a negative effect on the approval process of other product candidates of ours or result in losing approval of any approved product candidate.

Risks related to sales, marketing and competition

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, and our estimates of the prevalence of our target patient populations may be inaccurate.

Cancer and autoimmune therapies are sometimes characterized as first-line, second-line, third-line and even fourth-line, and the FDA often approves new therapies initially only for last-line use. Initial approvals for new cancer and autoimmune therapies are often restricted to later lines of therapy, and in the case of cancer specifically, for patients with advanced or metastatic disease. This will limit the number of patients who may be eligible for such new therapies, which may include our product candidates.

Our projections of both the number of people who have the diseases we are targeting, as well as the subset of people with these diseases in a position to receive our therapies, if approved, are based on our beliefs and estimates. These estimates have been derived from a variety of sources, including scientific literature, input from key opinion leaders, patient foundations, or secondary market research databases, and may prove to be incorrect. For example, the number of new products in development for the diseases we are targeting continues to grow, and it is conceivable that patients will have multiple treatment options in the future. Further, new studies may change the estimated incidence or prevalence of these diseases. 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. Furthermore, regulators and payors may further narrow the therapy-accessible treatment population. Even if we obtain significant market share for our product candidates, because certain of the potential target populations are small, we may never achieve profitability without obtaining regulatory approval for additional indications.

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

The biopharmaceutical industry is characterized by intense competition and rapid innovation. Our competitors may be able to develop other compounds, drugs, cellular or gene therapies that are able to achieve similar or better results. Our potential competitors include major multinational pharmaceutical companies, established biotechnology companies, specialty pharmaceutical companies and universities and other research institutions. Many of our competitors have substantially greater financial, technical and other resources, such as larger research and development staff, experienced marketing and manufacturing organizations and well-established sales forces. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large, established companies. Established pharmaceutical companies may also invest heavily to accelerate discovery and development of novel therapeutics or to in-license novel therapeutics that could make the product candidates that we develop obsolete. Mergers and acquisitions in the biotechnology and pharmaceutical industries may result in even more resources being concentrated in our competitors. Competition may increase further as a result of advances in the commercial applicability of technologies and greater availability of capital for investment in these industries. Our competitors, either alone or with collaborative partners, may succeed in developing, acquiring or licensing on an exclusive basis drug, biologic, cellular or gene therapy products that are more effective, safer, more easily commercialized or less costly than our product candidates or may develop proprietary technologies or secure patent protection that we may need for the development of our technologies and products. We believe the key competitive factors that will affect the development and commercial success of our product candidates are efficacy, safety, tolerability, reliability, convenience of use, price and reimbursement.

We anticipate competing with the largest biopharmaceutical companies in the world, as well as a broad range of smaller biotechnology companies which are currently conducting research in cellular therapies, either alone or in partnerships with other parties, and all of which have or may have greater financial and human resources than we currently have. In addition to these fully integrated biopharmaceutical companies, we also compete with those companies whose products target the same indications as our product candidates. Many third parties compete with us in developing various approaches to cancer and autoimmune therapies. They include pharmaceutical companies, biotechnology companies, academic institutions and other research organizations. Any treatments developed by our competitors could be superior to our RCT product candidates. It is possible that these competitors will succeed in developing technologies that are

more effective than our RCTs or that would render our cancer targeted RCTs obsolete or noncompetitive. We anticipate that we will face increased competition in the future as additional companies enter our market and scientific developments surrounding other cancer and autoimmune therapies continue to accelerate.

There are at least two companies leveraging red blood cells to develop therapeutics for cancer and/or immune tolerance. Erytech Pharma SA is using reversible hypotonic and hypertonic osmotic stress to encapsulate drug substances inside of red blood cells to create product candidates for use in cancer and orphan diseases. SQZ Biotechnologies Company is pursuing applications in cancer, infectious disease and autoimmune diseases using a variety of cell-based approaches, including red blood cells.

Outside of RBC-based competition, there are a number of companies competing in our target therapeutic areas. Within oncology, multiple large and small companies are developing novel immune stimulatory agents, such as Nektar Therapeutics, which is developing a polymer-conjugated IL-15, and Genmab, which is developing a bispecific antibody targeting PD-L1 and 4-1BB. Others are developing activated and engineered NK cell product candidates as cancer therapeutics against both hematologic and solid tumor malignancies, such as Fate Therapeutics. Many companies are developing therapies to generate antigen-specific immune responses against HPV-positive cancers, such as BioNTech SE using RNA and Inovio Pharmaceuticals, Inc. using DNA-based therapy. Finally, multiple companies are developing novel approaches to restore immune tolerance, such as Anokion SA, which is developing engineered proteins for celiac disease, Type 1 diabetes and multiple sclerosis.

In addition to the companies described above, we anticipate competing with the largest biopharmaceutical companies in the world, such as Novartis AG, Gilead Sciences, Inc., Amgen, Inc., F. Hoffman-La Roche AG (Roche), Johnson & Johnson, and Pfizer, Inc.

Even if we obtain regulatory approval to market our product candidates, the availability and price of our competitors' products could limit the demand and the price we are able to charge for our product candidates. We may not be able to implement our business plan if the acceptance of our product candidates is inhibited by price competition or the reluctance of physicians to switch from existing methods of treatment to our product candidates, or if physicians switch to other new drug or biologic products or choose to reserve our product candidates for use in limited circumstances.

Even if a product candidate we develop receives marketing approval, it may fail to achieve the degree of market acceptance by physicians, patients, third-party payors and others in the medical community necessary for commercial success.

If any product candidate we develop receives marketing approval, whether as a single agent or in combination with other therapies, it may nonetheless fail to gain sufficient market acceptance by physicians, patients, third-party payors, and others in the medical community. For example, other cancer treatments like chemotherapy, radiation therapy and immunotherapy are well established in the medical community, and doctors may continue to rely on these therapies. If the product candidates we develop do not achieve an adequate level of acceptance, we may not generate significant product revenues and we may not become profitable. The degree of market acceptance of any product candidate, if approved for commercial sale, will depend on a number of factors, including:

- efficacy, safety and potential advantages compared to alternative treatments;
- convenience and ease of administration compared to alternative treatments;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;
- public perception of new therapies, including cellular therapies;
- the strength of marketing and distribution support;
- the ability to offer our products, if approved, for sale at competitive prices;

- the ability to obtain sufficient third-party insurance coverage and adequate reimbursement, including with respect to the use of the approved product as a combination therapy;
- adoption of a companion diagnostic and/or complementary diagnostic; and
- the prevalence and severity of any side effects.

Cellular therapies are a novel approach and negative perception of any product candidates that we develop could adversely affect our ability to conduct our business or obtain regulatory approvals for such product candidates.

Cellular therapies in general, and RCTs in particular, remain novel and unproven therapies, with no genetically engineered red blood cell therapy approved to date in the United States or the European Union. RCTs may not gain the acceptance of the public or the medical community. For example, CAR-Ts and other cellular therapies have in some cases caused severe side effects and even mortality and their broader use may therefore be limited. Although our RCTs are fundamentally different than these earlier cellular therapies, they may be viewed in the same vein, limiting their market acceptance. Further, with respect to our RTX-240 and RTX-321 programs, the use of potent T cell and NK cell stimulation as a potential treatment for solid or hematological cancers is a recent scientific development and may not become broadly accepted by physicians, patients, hospitals, cancer treatment centers and others in the medical community.

Our success will depend upon physicians who specialize in the treatment of diseases targeted by our product candidates prescribing treatments that involve the use of our product candidates in lieu of, or in addition to, existing treatments with which they are more familiar and for which greater clinical data may be available. Adverse events in clinical trials of our product candidates or in clinical trials of others developing similar products and the resulting publicity, as well as any other adverse events in the field of cellular therapies, could result in a decrease in demand for any product that we may develop. In addition, responses by the U.S., state or foreign governments to negative public perception or ethical concerns may result in new legislation or regulations that could limit our ability to develop or commercialize any product candidates, obtain or maintain regulatory approval or otherwise achieve profitability. More restrictive statutory regimes, government regulations or negative public opinion would have an adverse effect on our business, financial condition, results of operations and prospects and may delay or impair the development and commercialization of our product candidates or demand for any products we may develop.

We currently have no marketing and sales organization and have no experience in marketing products. If we are unable to establish marketing and sales capabilities or enter into agreements with third parties to market and sell our product candidates, we may not be able to generate product revenue.

We currently have no sales, marketing or distribution capabilities and have no experience in marketing products. We may develop an in-house marketing organization and sales force, which will require significant capital expenditures, management resources and time. In the event we develop and deploy these capabilities, we will have to compete with other pharmaceutical and biotechnology companies to recruit, hire, train and retain marketing and sales personnel.

In addition to establishing internal sales, marketing and distribution capabilities, we may pursue collaborative arrangements regarding the sales and marketing of our products, however, there can be no assurance that we will be able to establish or maintain such collaborative arrangements, or if we are able to do so, that they will have effective sales forces. Any revenue we receive will depend upon the efforts of such third parties, which may not be successful. We may have little or no control over the marketing and sales efforts of such third parties and our revenue from product sales may be lower than if we had commercialized our product candidates ourselves. We also face competition in our search for third parties to assist us with the sales and marketing efforts of our product candidates.

There can be no assurance that we will be able to develop in-house sales and distribution capabilities or establish or maintain relationships with third-party collaborators to commercialize any product in the United States or overseas.

A variety of risks associated with marketing our product candidates internationally could materially adversely affect our business.

We plan to seek regulatory approval of our product candidates outside of the United States and, accordingly, we expect that we will be subject to additional risks related to operating in foreign countries if we obtain the necessary approvals, including:

- differing regulatory requirements in foreign countries;
- unexpected changes in tariffs, trade barriers, price and exchange controls and other regulatory requirements;
- economic weakness, including inflation, or political instability in particular foreign economies and markets;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- foreign taxes, including withholding of payroll taxes;
- foreign currency fluctuations, which could result in increased operating expenses and reduced revenue, and other obligations incident to doing business in another country;
- difficulties staffing and managing foreign operations;
- workforce uncertainty in countries where labor unrest is more common than in the United States;
- potential liability under the Foreign Corrupt Practices Act, or FCPA, or comparable foreign regulations;
- challenges enforcing our contractual and intellectual property rights, especially in those foreign countries that do not respect and protect intellectual property rights to the same extent as the United States;
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad; and
- business interruptions resulting from geo-political actions, including war and terrorism or global pandemics, including but not limited to, COVID-19.

These and other risks associated with our international operations may materially adversely affect our ability to attain or maintain profitable operations.

Risks related to our business operations

The effects of health epidemics like the recent and ongoing COVID-19 pandemic, including recurring surges and waves of infection and emergent variants of the coronavirus, in regions where we, or the third parties on which we rely, have business operations could adversely impact our business, including our clinical supply, preclinical studies and ongoing and planned clinical trials. The ongoing COVID-19 pandemic could materially affect our operations, including at our headquarters in Massachusetts and our manufacturing facility in Rhode Island, as well as the businesses or operations of our contract research organizations, or CROs, or other third parties with whom we conduct business.

The recent outbreak of COVID-19 was reported to have originated in Wuhan, China, in December 2019 and has since spread to most countries around the world, including the United States. In March 2020, the World Health Organization declared the COVID-19 outbreak a global pandemic. In response to the rapid global spread of the virus, national, state, and local governments issued orders and recommendations to attempt to reduce the further spread of the disease. Such orders included movement control and shelter-in-place orders, travel restrictions, limitations on public gatherings, school

closures, social distancing requirements and the closure of all but critical and essential services and infrastructure. The President of the United States declared the COVID-19 pandemic a national emergency, invoking powers under the Stafford Act, the legislation that directs federal emergency disaster response. In addition, on March 23, 2020, the Governor of Massachusetts ordered all individuals living in the Commonwealth of Massachusetts to stay at their place of residence for an indefinite period of time (subject to certain exceptions to facilitate authorized necessary activities) to mitigate the impact of the COVID-19 pandemic. The executive order exempts certain individuals needed to maintain continuity of operations of critical infrastructure sectors as determined by the federal government, and the Governor has clarified that biopharmaceutical research and development is essential and exempt. Further, on March 28, 2020 the Governor of Rhode Island ordered all individuals living in the State of Rhode Island and Providence Plantations to stay at their place of residence until April 13, 2020, which was subsequently extended to May 8, 2020 to mitigate the impact of the COVID-19 pandemic. Although many of these restrictions have been eased or lifted in light of vaccination rates and as cases in the United States, including Massachusetts and Rhode Island, have decreased, these eased or lifted protocols may be reinstated or become more restrictive if the United States or certain areas experience a resurgence of infections.

Our suppliers and vendors are all subject to these restrictions and orders and have been similarly impacted. Fluctuation in infection rates in the regions in which we have business operations has resulted in periodic changes in restrictions that vary from region to region and require vigilant attention and rapid response to new or reinstated restrictions. The duration and severity of the pandemic, as well as periodic spikes in infection rates, new strains of the virus that causes COVID-19, local outbreaks and resurgence of the virus, and the broad availability of effective vaccines have impacted, and may continue to impact, our preclinical studies and clinical trial operations. While not materially adversely affected, our business continues to experience the impact of COVID-19 on our supply chain, vendor operations and clinical trial activities. The ultimate extent of such impact, including on the supply chain for our candidates and our clinical trial activities, will depend on future developments, which are highly uncertain and cannot be predicted with confidence, such as the duration of the pandemic, the severity of COVID-19, or the effectiveness of actions and vaccinations to contain and treat COVID-19. The continued spread of COVID-19 globally, including the identification of new strains of COVID-19, could continue to adversely impact our preclinical studies and plans for clinical trials in the United States, including our ability to recruit and retain patients and principal investigators and site staff who, as healthcare providers, may have heightened exposure to COVID-19 if an outbreak occurs in their geography. COVID-19 may also affect employees of third-party CROs located in affected geographies that we will rely upon to carry out our clinical trials. Any continuing negative impact COVID-19 has on patient enrollment or treatment, including access to study sites, availability of study data, or the advancement of our current product candidates and any future product candidates could cause costly delays to clinical trial activities, which could adversely affect our ability to obtain regulatory approval for and to commercialize our current product candidates and any future product candidates, increase our operating expenses, and have a material adverse effect on our financial results.

Further, we have begun to see the effect that the ongoing COVID-19 pandemic has had on enrollment in our clinical trials due to, among other reasons, staffing challenges at our clinical trial sites and site availability generally. Key clinical trial activities, such as site monitoring, have experienced interruptions due to restrictions in travel, and some patients have been, and may continue to be, unwilling to enroll in our trials or unable to comply with clinical trial protocols, including as a result of quarantines or travel restrictions which impede patient movement or interrupt healthcare services. Such interruptions to clinical activities and impacts on enrollment could delay our ability to conduct clinical trials or release clinical trial results. While not material, the spread of COVID-19 has in some cases negatively affected the operations at our third-party vendors, which has resulted in delays and disruptions in the supply of some components of our current product candidates and could impact the supply of any future product candidates. In addition, we have taken and may continue to take temporary precautionary measures intended to help minimize the risk of the virus to our employees, including temporarily requiring all employees to work remotely, suspending all non-essential travel worldwide for our employees, and discouraging employee attendance at industry events and in-person work-related meetings, which could negatively affect our business.

Additionally, three vaccines for COVID-19 were granted Emergency Use Authorization by the FDA in late 2020 and early 2021, and more may be authorized in the future. The resultant demand for vaccines and potential for manufacturing facilities and materials to be commandeered under the Defense Production Act of 1950, or equivalent foreign legislation,

has in some instances made it more difficult, or has delayed our ability, to timely obtain materials or manufacturing slots for the product candidates needed for our clinical trials, which could lead to future delays in these trials.

We cannot presently predict the scope and severity of any potential business shutdowns or disruptions due to the ongoing COVID-19 pandemic or any potential future resurgences thereof. While the negative effects of the COVID-19 pandemic appear to be lessening and vaccines have been widely distributed and continue to be distributed in the United States, numerous other countries have not developed or distributed vaccines at all or on widespread bases, and, therefore, we may continue to see widespread impact of the COVID-19 pandemic. Additionally, there is a possibility that new variants of the coronavirus will display resistance to the vaccines we currently have available, and in limited instances, have already begun to appear and demonstrate vaccine resistance in various parts of the globe. If we or any of the third parties with whom we engage were to experience shutdowns or other business disruptions, our ability to conduct our business in the manner and on the timelines presently planned could be materially and negatively affected, which could have a material adverse impact on our business and our results of operation and financial condition.

We will need to grow the size of our organization, and we may experience difficulties in managing this growth.

As of July 31, 2021, we had 248 full-time employees. As our research, development, manufacturing and commercialization plans and strategies develop over time, we expect to need additional managerial, operational, sales, marketing, financial and other personnel. Future growth would impose significant added responsibilities on members of management, including:

- identifying, recruiting, compensating, integrating, maintaining and motivating additional employees;
- managing our internal research and development efforts effectively, including identification of clinical candidates, scaling our manufacturing process and navigating the clinical and FDA review process for our product candidates; and
- improving our operational, financial and management controls, reporting systems and procedures.

Our future financial performance and our ability to commercialize our product candidates will depend, in part, on our ability to effectively manage any future growth, and our management may also have to divert a disproportionate amount of its attention away from day-to-day activities in order to devote a substantial amount of time to managing these growth activities.

We currently rely, and for the foreseeable future will continue to rely, in substantial part on certain organizations, advisors and consultants to provide certain services, including many aspects of regulatory affairs, clinical management and manufacturing. There can be no assurance that the services of these organizations, advisors and consultants will continue to be available to us on a timely basis when needed, or that we can find qualified replacements. In addition, if we are unable to effectively manage our outsourced activities or if the quality or accuracy of the services provided by consultants is compromised for any reason, our clinical trials may be extended, delayed or terminated, and we may not be able to obtain regulatory approval of our product candidates or otherwise advance our business. There can be no assurance that we will be able to manage our existing consultants or find other competent outside contractors and consultants on economically reasonable terms, or at all.

If we are not able to effectively expand our organization by hiring new employees and expanding our groups of consultants and contractors, we may not be able to successfully implement the tasks necessary to further develop and commercialize our product candidates and, accordingly, may not achieve our research, development and commercialization goals.

If we lose key management personnel, or if we fail to recruit additional highly skilled personnel, our ability to identify and develop new or next generation product candidates will be impaired, could result in loss of markets or market share and could make us less competitive.

Our ability to compete in the highly competitive biotechnology and pharmaceutical industries depends upon our ability to attract and retain highly qualified managerial, scientific and medical personnel. We are highly dependent on our management, scientific and medical personnel, including David R. Epstein, our Chairman, Pablo J. Cagnoni, our Chief Executive Officer, Jose Carmona, our Chief Financial Officer, Christina Coughlin, our Chief Medical Officer, Laurence Turka, our Chief Scientific Officer and Spencer Fisk, our Senior Vice President of Manufacturing and Chief Technology Officer. The loss of the services of any of our executive officers, other key employees, and other scientific and medical advisors, and our inability to find suitable replacements could result in delays in product development and harm our business.

We conduct our operations at our facilities in Cambridge, Massachusetts and Smithfield, Rhode Island. The New England region is headquarters to many other biopharmaceutical companies and many academic and research institutions. Competition for skilled personnel in our market is intense and may limit our ability to hire and retain highly qualified personnel on acceptable terms or at all.

To induce valuable employees to remain at our company, in addition to salary and cash incentives, we have provided restricted stock and stock options that vest over time. The value to employees of stock options that vest over time may be significantly affected by movements in our stock price that are beyond our control and may at any time be insufficient to counteract more lucrative offers from other companies. Despite our efforts to retain valuable employees, members of our management, scientific and development teams may terminate their employment with us on short notice. Employment of our key employees is at-will, which means that any of our employees could leave our employment at any time, with or without notice. We do not maintain “key man” insurance policies on the lives of these individuals or the lives of any of our other employees. Our success also depends on our ability to continue to attract, retain and motivate highly skilled junior, mid-level and senior managers, as well as junior, mid-level and senior scientific and medical personnel.

Business disruptions could seriously harm our future revenue and financial condition and increase our costs and expenses.

Our operations, and those of our CROs, any future contract manufacturing organizations, or CMOs, and other contractors and consultants, could be subject to earthquakes, power shortages, telecommunications failures, water shortages, floods, hurricanes, typhoons, fires, extreme weather conditions, medical epidemics, including the ongoing COVID-19 pandemic, and other natural or man-made disasters or business interruptions, for which we are predominantly self-insured. The occurrence of any of these business disruptions could seriously harm our operations and financial condition and increase our costs and expenses. We rely on third-party vendors to supply raw materials and other important components that are used to manufacture our product candidates. Our ability to manufacture clinical supplies of our product candidates could be disrupted if the operations of these suppliers are affected by a man-made or natural disaster or other business interruption.

Regulators globally are also imposing greater monetary fines for privacy violations. For example, in 2016, the European Union adopted a new regulation governing data practices and privacy called the General Data Protection Regulation, or GDPR, which became effective on May 25, 2018. The GDPR applies to any company that collects and uses personal data in connection with offering goods or services to individuals in the European Union or the monitoring of their behavior. Non-compliance with the GDPR may result in monetary penalties of up to €20 million or 4% of worldwide revenue, whichever is higher. The GDPR and other changes in laws or regulations associated with the enhanced protection of certain types of personal data, such as healthcare data or other sensitive information, could greatly increase the cost of providing our product candidates, if approved, or even prevent us from offering our product candidates, if approved, in certain jurisdictions.

Our internal computer systems, or those used by our CROs, any future CMOs or other contractors or consultants, may fail or suffer security breaches.

Despite the implementation of security measures, our internal computer systems and those of our CROs, any future CMOs and other contractors and consultants are vulnerable to damage from computer viruses and unauthorized access. While we have not experienced any such material system failure 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 currently rely on outside vendors to supply raw materials and other important components, such as CD34+ precursor cells and lentiviral vectors, that are used to manufacture our product candidates and to conduct clinical trials, and similar events relating to their computer systems could also have a material adverse effect on our business. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and the further development and commercialization of our product candidates could be delayed.

Risks related to litigation and noncompliance with applicable laws or regulations

If product liability lawsuits are brought against us, we may incur substantial liabilities and may be required to limit commercialization of our product candidates.

We face an inherent risk of product liability as a result of testing our product candidates in clinical trials and will face an even greater risk if we commercialize any products. For example, we may be sued if our product candidates cause or are perceived to cause injury or are found to be otherwise unsuitable during clinical trials, manufacturing, marketing or sale. Any such product liability claims may include allegations of defects in manufacturing, defects in design, a failure to warn of dangers inherent in the product, negligence, strict liability or a breach of warranties. Claims could also be asserted under state consumer protection acts. If we cannot successfully defend ourselves against product liability claims, we may incur substantial liabilities or be required to limit commercialization of our product candidates. Even successful defense would require significant financial and management resources. Regardless of the merits or eventual outcome, liability claims may result in:

- inability to bring a product candidate to the market;
- decreased demand for our products;
- injury to our reputation;
- withdrawal of clinical trial participants and inability to continue clinical trials;
- initiation of investigations by regulators;
- costs to defend the related litigation;
- diversion of management’s time and our resources;
- substantial monetary awards to trial participants or patients;
- product recalls, withdrawals or labeling, marketing or promotional restrictions;
- loss of revenue;
- exhaustion of any available insurance and our capital resources;
- the inability to commercialize any product candidate; and

- declines in our share price.

Our inability to obtain sufficient product liability insurance at an acceptable cost to protect against potential product liability claims could prevent or inhibit the commercialization of products we develop, alone or with collaborators. If and when coverage is secured, our insurance policies may also have various exclusions, and we may be subject to a product liability claim for which we have no coverage. We may have to pay any amounts awarded by a court or negotiated in a settlement that exceed our coverage limitations or that are not covered by our insurance, and we may not have, or be able to obtain, sufficient capital to pay such amounts. Even if our agreements with any future corporate collaborators entitle us to indemnification against losses, such indemnification may not be available or adequate should any claim arise.

Our employees, independent contractors, consultants, commercial partners and vendors may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements.

We are exposed to the risk of employee fraud or other illegal activity by our employees, independent contractors, consultants, commercial partners and vendors. Misconduct by these parties could include intentional, reckless and/or negligent conduct that fails to comply with the laws of the FDA and other similar foreign regulatory bodies, provide true, complete and accurate information to the FDA and other similar foreign regulatory bodies, comply with manufacturing standards we have established, comply with healthcare fraud and abuse laws in the United States and similar foreign fraudulent misconduct laws, or report financial information or data accurately or to disclose unauthorized activities to us. If we obtain FDA approval of any of our product candidates and begin commercializing those products in the United States, our potential exposure under such laws will increase significantly, and our costs associated with compliance with such laws are also likely to increase. These laws may impact, among other things, our current activities with principal investigators and research patients, as well as proposed and future sales, marketing and education programs.

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

Healthcare providers, physicians and third-party payors in the United States and elsewhere play a primary role in the recommendation and prescription of pharmaceutical products. Arrangements with third-party payors and customers can expose pharmaceutical manufacturers to broadly applicable fraud and abuse and other healthcare laws and regulations, including, without limitation, the federal Anti-Kickback Statute and the federal False Claims Act, which may constrain the business or financial arrangements and relationships through which such companies sell, market and distribute pharmaceutical products. In particular, the promotion, sales and marketing of healthcare items and services, as well as certain business arrangements in the healthcare industry, are subject to extensive laws designed to prevent fraud, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, structuring and commission(s), certain customer incentive programs and other business arrangements generally. Activities subject to these laws also involve the improper use of information obtained in the course of patient recruitment for clinical trials. The applicable federal, state and foreign healthcare laws and regulations laws that may affect our ability to operate include, but are not limited to:

- the federal Anti-Kickback Statute, which prohibits, among other things, knowingly and willfully soliciting, receiving, offering, providing or paying any remuneration (including any kickback, bribe or rebate), directly or indirectly, overtly or covertly, in cash or in kind, to induce, or in return for, either the referral of an individual, or the purchase, lease, order or recommendation or arrangement of any good, facility, item or service for which payment may be made, in whole or in part, under a federal healthcare program, such as the Medicare and Medicaid programs. A person or entity can be found guilty of violating the statute without actual knowledge of the statute or specific intent to violate it. Violations are subject to civil and criminal fines and penalties for each violation, plus up to three times the remuneration involved, imprisonment, and exclusion from government healthcare programs. In addition, 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, or FCA. The Anti-Kickback Statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, purchasers, and

formulary managers on the other. There are a number of statutory exceptions and regulatory safe harbors protecting some common activities from prosecution;

- federal civil and criminal false claims laws and civil monetary penalty laws, including the FCA, which impose criminal and civil penalties and authorize civil whistleblower or qui tam actions, prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, false, fictitious or fraudulent claims for payment to, or approval by, Medicare, Medicaid, or other federal healthcare programs, knowingly making, using or causing to be made or used a false record or statement material to a false or fraudulent claim or an obligation to pay or transmit money or property to the federal government or knowingly concealing or knowingly and improperly avoiding, decreasing or concealing an obligation to pay money to the federal government. A claim that includes items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim under the FCA. Manufacturers can be held liable under the FCA even when they do not submit claims directly to government payors if they are deemed to "cause" the submission of false or fraudulent claims. The FCA also permits a private individual acting as a "whistleblower" to bring actions on behalf of the federal government alleging violations of the FCA and to share in any monetary recovery;

- the federal anti-inducement law, prohibits, among other things, the offering or giving of remuneration, which includes, without limitation, any transfer of items or services for free or for less than fair market value (with limited exceptions), to a Medicare or Medicaid beneficiary that the person knows or should know is likely to influence the beneficiary's selection of a particular supplier of items or services reimbursable by a federal or state governmental program;

- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which created new federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program or obtain, by means of false or fraudulent pretenses, representations, or promises, any of the money or property owned by, or under the custody or control of, any healthcare benefit program, regardless of the payor (e.g., public or private) and knowingly and willfully falsifying, concealing or covering up by any trick or device a material fact or making any materially false, fictitious or fraudulent statements or representations in connection with the delivery of, or payment for, healthcare benefits, items or services relating to healthcare matters. Similar to the federal Anti-Kickback Statute, a person or entity can be found guilty of violating HIPAA without actual knowledge of the statute or specific intent to violate it;

- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, or HITECH, and their respective implementing regulations, which impose, among other things, requirements on certain covered healthcare providers, health plans, and healthcare clearinghouses, as well as their respective business associates, independent contractors or agents of covered entities that perform services for them that involve the creation, receipt, transmission, use or disclosure of, individually identifiable health information, relating to the privacy, security and transmission of individually identifiable health information without appropriate authorization. HITECH also created new tiers of civil monetary penalties, amended HIPAA to make civil and criminal penalties directly applicable to business associates, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorneys' fees and costs associated with pursuing federal civil actions. In addition, there may be additional federal, state and non-U.S. laws which govern the privacy and security of health and other personal information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts;

- the federal Physician Payment Sunshine Act, created under the Patient Protection and Affordable Care Act, and its implementing regulations, which require manufacturers of drugs, devices, biologicals and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to report annually to the United States Department of Health and Human Services, or HHS, information related to payments or other "transfers of value" made to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors) and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members. Effective January 1, 2022, these reporting obligations will

extend to include transfers of value made to certain non-physician providers, such as physician assistants and nurse practitioners;

- the U.S. Federal Food, Drug, and Cosmetic Act, or FDCA, which prohibits, among other things, the adulteration or misbranding of drugs, biologics and medical devices;

- federal consumer protection and unfair competition laws, which broadly regulate marketplace activities and activities that potentially harm consumers; and

- analogous state and foreign laws and regulations, such as state anti-kickback and false claims laws, which may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers, and may be broader in scope than their federal equivalents; state and foreign laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government or otherwise restrict payments that may be made to healthcare providers or other potential referral sources; state and foreign laws that require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures; 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.

The distribution of pharmaceutical products is subject to additional requirements and regulations, including extensive record-keeping, licensing, storage and security requirements intended to prevent the unauthorized sale of pharmaceutical products. In addition, the approval and commercialization of any of our product candidates outside the United States will also likely subject us to foreign equivalents of the healthcare laws mentioned above, among other foreign laws.

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 could be subject to challenge and may not comply under one or more of such laws, regulations, and guidance. Additionally, the scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of healthcare reform, especially in light of the lack of applicable precedent and regulations. Federal and state enforcement bodies have recently increased their scrutiny of interactions between healthcare companies and healthcare providers, which has led to a number of investigations, prosecutions, convictions and settlements in the healthcare industry. Ensuring business arrangements comply with applicable healthcare laws, as well as responding to possible investigations by government authorities, can be time- and resource-consuming, involve substantial costs, and can divert a company's attention from the business.

Ensuring that our internal operations and future business arrangements with third parties comply with applicable healthcare laws and regulations have involved, and will continue to involve substantial costs. We have adopted a code of business conduct and ethics, but it is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent inappropriate conduct may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations. It is possible that governmental and enforcement authorities will conclude that our business practices may 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, those actions could have a significant impact on our business, including the imposition of civil, criminal and administrative penalties, damages, disgorgement, monetary fines, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, individual imprisonment, contractual damages, reputational harm, diminished profits and future earnings, and curtailment of our operations, as well as additional reporting obligations and oversight if we become subject to a corporate integrity agreement or other agreement to resolve allegations of non-compliance with these laws, any of which could adversely affect our ability to operate our business and our results of operations. Further, defending against any such actions can be costly and time consuming, and may require significant financial and personnel resources. Therefore, even if we are successful in defending against any such actions that may be brought against us, our business may be impaired. If any of the physicians, manufacturers other providers or entities with whom we expect to do business is found to not be in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions

from government funded healthcare programs and imprisonment. Prohibitions or restrictions on sales or withdrawal of future marketed products could materially affect business in an adverse way. If any of the above occur, our ability to operate our business and our results of operations could be adversely affected.

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

Competitors may infringe our patents or the patents of our licensing partners, or we may be required to defend against claims of infringement. In addition, our patents or the patents of our licensing partners also may become involved in inventorship, priority or validity disputes. To counter or defend against such claims can be expensive and time-consuming. In an infringement proceeding, a court may decide that a patent owned or in-licensed by us is invalid or unenforceable, the other party's use of our patented technology falls under the safe harbor to patent infringement under 35 U.S.C. §271(e)(1), or may refuse to stop the other party from using the technology at issue on the grounds that our owned and in-licensed patents do not cover the technology in question. An adverse result in any litigation proceeding could put one or more of our owned or in-licensed patents at risk of being invalidated or interpreted narrowly. Even if we establish infringement, the court may decide not to grant an injunction against further infringing activity and instead award only monetary damages, which may or may not be an adequate remedy. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation.

Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims may cause us to incur significant expenses and could distract our personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions, or other interim proceedings or developments, and if securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing, or distribution activities. We may not have sufficient financial or other resources to conduct such litigation or proceedings adequately. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources and more mature and developed intellectual property portfolios. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have a material adverse effect on our ability to compete in the marketplace.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could have a material adverse effect on the success of our business.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. Our research and development activities involve the use of biological and hazardous materials and produce hazardous waste products. We generally contract with third parties for the disposal of these materials and wastes. We cannot eliminate the risk of contamination or injury from these materials, which could cause an interruption of our research and development efforts, business operations and any future commercialization efforts or environmental damage resulting in costly clean-up and liabilities under applicable laws and regulations governing the use, storage, handling and disposal of these materials and specified waste products. Although we believe that the safety procedures we have implemented for handling and disposing of these materials generally comply with the standards prescribed by these laws and regulations, we cannot guarantee that this is the case or eliminate the risk of accidental contamination or injury from these materials. In such an event, we may be held liable for any resulting damages and such liability could exceed our resources and state or federal or other applicable authorities may curtail our use of certain materials and/or interrupt our business operations. Furthermore, environmental laws and regulations are complex, change frequently and have tended to become more stringent. We cannot predict the impact of such changes and cannot be certain of our future compliance. In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research, development or production efforts. Failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

Although we maintain workers' compensation insurance to cover us for costs and expenses, we may incur due to injuries to our employees resulting from the use of hazardous materials or other work-related injuries, this insurance may not provide adequate coverage against potential liabilities. We do not carry specific biological waste or hazardous waste insurance coverage, workers compensation or property and casualty and general liability insurance policies that include coverage for damages and fines arising from biological or hazardous waste exposure or contamination.

We are subject to certain U.S. and foreign anti-corruption, anti-money laundering, export control, sanctions, and other trade laws and regulations. We can face serious consequences for violations.

Among other matters, U.S. and foreign anti-corruption, anti-money laundering, export control, sanctions, and other trade laws and regulations, which are collectively referred to as Trade Laws, prohibit companies and their employees, agents, clinical research organizations, legal counsel, accountants, consultants, contractors, and other partners from authorizing, promising, offering, providing, soliciting, or receiving directly or indirectly, corrupt or improper payments or anything else of value to or from recipients in the public or private sector. Violations of Trade Laws can result in substantial criminal fines and civil penalties, imprisonment, the loss of trade privileges, debarment, tax reassessments, breach of contract and fraud litigation, reputational harm, and other consequences. We have direct or indirect interactions with officials and employees of government agencies or government-affiliated hospitals, universities, and other organizations. We also expect our non-U.S. activities to increase in time. We currently engage, and plan to continue to engage, third parties for clinical trials and/or to obtain necessary permits, licenses, patent registrations, and other regulatory approvals and we can be held liable for the corrupt or other illegal activities of our personnel, agents, or partners, even if we do not explicitly authorize or have prior knowledge of such activities.

Risks related to government regulation

We are early in our development efforts. If we are unable to advance our product candidates into and through clinical development, obtain regulatory approval and ultimately commercialize our product candidates or experience significant delays in doing so, our business will be materially harmed.

We are early in our development efforts. The INDs for RTX-240 and RTX-321 have been allowed to proceed by the FDA. We have completed dosing of the fifth cohort in the Phase 1/2 clinical trial for advanced solid tumors, have added two additional cohorts in the Phase 1/2 trial of single-agent RTX-240 in advanced solid tumors and have continued to enroll patients in the Phase 1 clinical trial for AML. We also began dosing patients in the Phase 1 clinical trial of RTX-321 for the treatment of advanced HPV 16-positive cancers. Furthermore, we recently began dosing patients with RTX-240 in combination with pembrolizumab in a new Phase 1 arm of the ongoing Phase 1/2 clinical trial for advanced solid tumors. We cannot be sure that submission of any future INDs or subsequent protocol amendments will result in the FDA allowing testing and clinical trials to begin or proceed, or that, once begun, issues will not arise that lead to the suspension or termination of such clinical trials. Additionally, even if such regulatory authorities agree with the design and implementation of the clinical trials set forth in an IND or clinical trial application, we cannot guarantee that such regulatory authorities will not change their requirements in the future. The inability to complete clinical trials for RTX-240 or RTX-321 on the timelines currently anticipated or at all could have a material adverse effect on our business, results of operations and prospects.

All of our other product candidates are still in preclinical development. We have invested substantially all of our efforts and financial resources in the identification and preclinical development of RCTs, including the development of our initial product candidates - RTX-240 and RTX-321. Our ability to generate product revenues, which we do not expect will occur for many years, if ever, will depend on the successful development and eventual commercialization of our product candidates, which may never occur. We currently generate no revenue from sales of any products, and we may never be able to develop or commercialize a marketable product. In addition, certain of our product candidate development programs contemplate the development of companion diagnostics, which are assays or tests to identify an appropriate patient population. Companion diagnostics are subject to regulation as medical devices and must themselves be cleared or approved for marketing by the FDA or certain other foreign regulatory agencies before we may commercialize our products. The success of our product candidates will depend on several factors, including the following:

- successful completion of preclinical studies;
- approval of INDs for our planned clinical trials or future clinical trials;
- successful and timely enrollment in, and completion of, clinical trials;
- successful development and clearance or approval of companion diagnostics for use with certain of our product candidates;
- receipt of regulatory approvals from applicable regulatory authorities;
- establishing clinical supply and commercial manufacturing capabilities or making arrangements with third-party manufacturers for clinical supply and commercial manufacturing;
- obtaining and maintaining patent and trade secret protection or regulatory exclusivity for our product candidates;
- launching commercial sales of our product candidates, if and when approved, whether alone or in collaboration with others;
- acceptance of the product candidates, if and when approved, by patients, the medical community and third-party payors;
- effectively competing with other therapies;
- obtaining and maintaining third-party insurance coverage and adequate reimbursement;
- enforcing and defending intellectual property rights and claims; and
- maintaining a continued acceptable safety profile of the product candidates following approval.

If we do not achieve one or more of these factors in a timely manner or at all, we could experience significant delays or an inability to successfully commercialize our product candidates, which would materially harm our business. If we do not receive regulatory approvals for our product candidates, we may not be able to continue our operations.

Additionally, as of May 26, 2021, the FDA noted it is continuing to ensure timely reviews of applications for medical products during the ongoing COVID-19 pandemic in line with its user fee performance goals and conducting mission critical domestic and foreign inspections to ensure compliance of manufacturing facilities with FDA quality standards. However, the FDA may not be able to continue its current pace and approval timelines could be extended, including where a pre-approval inspection or an inspection of clinical sites is required and due to the ongoing COVID-19 pandemic and travel restrictions the FDA is unable to complete such required inspections during the review period. In 2020 and 2021, a number of companies announced receipt of complete response letters due to the FDA's inability to complete required inspections for their applications.

Obtaining and maintaining regulatory approval of our product candidates in one jurisdiction does not mean that we will be successful in obtaining regulatory approval of our product candidates in other jurisdictions.

We intend to submit marketing applications in both the U.S. and in selected foreign jurisdictions. Regulatory authorities in jurisdictions outside of the United States have requirements for approval of product candidates with which we must comply prior to marketing in those jurisdictions. Obtaining and maintaining regulatory approval of our product candidates in one jurisdiction does not guarantee that we will be able to obtain or maintain regulatory approval in any other jurisdiction, while a failure or delay in obtaining regulatory approval in one jurisdiction may have a negative effect on the regulatory approval process in others. For example, even if the FDA grants marketing approval of a product

candidate, comparable regulatory authorities in foreign jurisdictions must also approve the manufacturing, marketing and promotion of the product candidate in those countries.

Approval procedures vary among jurisdictions and can involve requirements and administrative review periods different from, and greater than, those in the United States, including additional nonclinical studies or clinical trials as clinical trials conducted in one jurisdiction may not be accepted by regulatory authorities in other jurisdictions. In many jurisdictions outside the United States, a product candidate must be approved for reimbursement before it can be approved for sale in that jurisdiction. In some cases, the price that we intend to charge for our products is also subject to approval.

Obtaining foreign regulatory approvals and compliance with foreign regulatory requirements could result in significant delays, difficulties and costs for us and could delay or prevent the introduction of our products in certain countries. If we fail to comply with the regulatory requirements in international markets and/or receive applicable marketing approvals, our target market will be reduced and our ability to realize the full market potential of our product candidates will be harmed.

If we are not able to obtain, or if there are delays in obtaining, required regulatory approvals for our product candidates, we will not be able to commercialize, or will be delayed in commercializing, our product candidates, and our ability to generate revenue will be materially impaired.

Our product candidates and the activities associated with their development and commercialization, including their design, testing, manufacture, safety, efficacy, recordkeeping, labeling, storage, approval, advertising, promotion, sale, distribution, import and export are subject to comprehensive regulation by the FDA and other regulatory agencies in the United States and by comparable authorities in other countries. Before we can commercialize any of our product candidates, we must obtain marketing approval. We have not received approval to market any of our product candidates from regulatory authorities in any jurisdiction and it is possible that none of our product candidates or any product candidates we may seek to develop in the future will ever obtain regulatory approval. We, as a company, have no experience in filing and supporting the applications necessary to gain regulatory approvals and have had to, and expect to continue to have to, rely on third-party CROs and/or regulatory consultants to assist us in this process. Securing regulatory approval requires the submission of extensive preclinical and clinical data and supporting information to the various regulatory authorities for each therapeutic indication to establish the drug candidate's safety and efficacy. Securing regulatory approval also requires the submission of information about the drug manufacturing process to, and inspection of manufacturing facilities and clinical sites by the relevant regulatory authority. Our product candidates may not be effective, may be only moderately effective or may prove to have undesirable or unintended side effects, toxicities or other characteristics that may preclude our obtaining marketing approval or prevent or limit commercial use.

The process of obtaining regulatory approvals, both in the United States and abroad, is expensive, may take many years if additional clinical trials are required, if approval is obtained at all, and can vary substantially based upon a variety of factors, including the type, complexity and novelty of the product candidates involved. Changes in marketing approval policies during the development period, changes in or the enactment of additional statutes or regulations, or changes in regulatory review for each submitted IND, Premarket Approval, or PMA, BLA or equivalent application types, may cause delays in the approval or rejection of an application. The FDA and comparable authorities in other countries have substantial discretion in the approval process and may refuse to accept any application or may decide that our data are insufficient for approval and require additional preclinical, clinical or other studies. Our product candidates could be delayed in receiving, or fail to receive, regulatory approval for many reasons, including the following:

- the FDA or comparable foreign regulatory authorities may disagree with the design or implementation of our clinical trials;

- we may be unable to demonstrate to the satisfaction of the FDA or comparable foreign regulatory authorities that a drug candidate is safe and effective for its proposed indication or a related companion diagnostic is suitable to identify appropriate patient populations;

- the results of clinical trials may not meet the level of statistical significance required by the FDA or comparable foreign regulatory authorities for approval;
- we may be unable to demonstrate that a product candidate's clinical and other benefits outweigh its safety risks;
- the FDA or comparable foreign regulatory authorities may disagree with our interpretation of data from preclinical studies or clinical trials;
- the data collected from clinical trials of our product candidates may not be sufficient to support the submission of an BLA or other submission or to obtain regulatory approval in the United States or elsewhere;
- the FDA or comparable foreign regulatory authorities may fail to approve our manufacturing processes or facilities or those of third-party manufacturers with which we contract for clinical and commercial supplies; and
- the approval policies or regulations of the FDA or comparable foreign regulatory authorities may significantly change in a manner rendering our clinical data insufficient for approval.

Of the large number of drugs in development, only a small percentage successfully complete the FDA or foreign regulatory approval processes and are commercialized. The lengthy approval process, as well as the unpredictability of future clinical trial results may result in our failing to obtain regulatory approval to market our product candidates, which would significantly harm our business, results of operations and prospects.

We expect the novel nature of our product candidates to create further challenges in obtaining regulatory approval. As a result, our ability to develop product candidates and obtain regulatory approval may be significantly impacted.

For example, the general approach for FDA approval of a new biologic or drug is for sponsors to seek licensure or approval based on dispositive data from well-controlled, Phase 3 clinical trials of the relevant product candidate in the relevant patient population. Phase 3 clinical trials typically involve hundreds of patients, have significant costs and take years to complete. We believe that we may be able to utilize the FDA's accelerated approval program for our product candidates given the limited alternatives for treatments for certain cancer and autoimmune diseases, but the FDA may not agree with our plans.

The FDA may also require a panel of experts, referred to as an Advisory Committee, to deliberate on the adequacy of the safety and efficacy data to support approval. The opinion of the Advisory Committee, although not binding, may have a significant impact on our ability to obtain approval of any product candidates that we develop based on the completed clinical trials. Additionally, due to the COVID-19 pandemic, the conduct of Advisory Committee meetings may be disrupted or delayed and the impact that may have on the overall timing of regulatory approvals is uncertain.

Moreover, approval of genetic or biomarker diagnostic tests may be necessary in order to advance some of our product candidates to clinical trials or potential commercialization, and regulatory agencies may require the development and approval of such tests. Accordingly, the regulatory approval pathway for such product candidates may be uncertain, complex, expensive and lengthy, and approval may not be obtained.

In addition, even if we were to obtain approval, regulatory authorities may approve any of our product candidates for fewer or more limited indications than we request, may not approve the price we intend to charge for our products, may grant approval contingent on the performance of costly post-marketing clinical trials, or may approve a product candidate with a label that does not include the labeling claims necessary or desirable for the successful commercialization of that product candidate. Any of the foregoing scenarios could materially harm the commercial prospects for our product candidates.

If we experience delays in obtaining approval or if we fail to obtain approval of our product candidates, the commercial prospects for our product candidates may be harmed and our ability to generate revenues will be materially impaired.

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

Potential undesirable side effects caused by our product candidates could cause us to interrupt, delay or halt preclinical studies or could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or other regulatory authorities. As is the case with many treatments for cancer and autoimmune diseases, it is likely that there may be side effects associated with their use. Results of our trials could reveal a high and unacceptable severity and prevalence of these or other side effects. In such an event, our trials could be suspended or terminated and the FDA or comparable 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 treatment-related side effects could affect patient recruitment or the ability of enrolled patients to complete the trial or result in potential product liability claims. Any of these occurrences may harm our business, financial condition and prospects significantly.

Further, clinical trials by their nature utilize a sample of the potential patient population. With a limited number of patients and limited duration of exposure, rare and severe side effects of our product candidates may only be uncovered with a significantly larger number of patients exposed to the product candidate. If our product candidates receive marketing approval and we or others identify undesirable side effects caused by such product candidates (or any other similar drugs) after such approval, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw or limit their approval of such product candidates;
- regulatory authorities may require the addition of labeling statements, such as a “boxed” warning or a contraindication;
- we may be required to create a medication guide outlining the risks of such side effects for distribution to patients;
- we may be required to change the way such product candidates are distributed or administered, conduct additional clinical trials or change the labeling of the product candidates;
- regulatory authorities may require a Risk Evaluation and Mitigation Strategy, or REMS, plan to mitigate risks, which could include medication guides, physician communication plans, or elements to assure safe use, such as restricted distribution methods, patient registries and other risk minimization tools;
- we may be subject to regulatory investigations and government enforcement actions;
- we may decide to remove such product candidates from the marketplace;
- we could be sued and held liable for injury caused to individuals exposed to or taking our product candidates; and
- our reputation may suffer.

We believe that any of these events could prevent us from achieving or maintaining market acceptance of the affected product candidates and could substantially increase the costs of commercializing our product candidates, if approved, and significantly impact our ability to successfully commercialize our product candidates and generate revenues.

Breakthrough Therapy Designation, Fast Track Designation or Regenerative Medicine Advanced Therapy Designation by the FDA, even if granted for any of our product candidates, may not lead to a faster development, regulatory review or approval process, and it does not increase the likelihood that any of our product candidates will receive marketing approval in the United States.

We may seek a Breakthrough Therapy Designation for some of our product candidates. A breakthrough therapy is defined as a therapy that is intended, alone or in combination with one or more other therapies, to treat a serious or life-

threatening disease or condition, and preliminary clinical evidence indicates that the therapy may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. For therapies that have been designated as breakthrough therapies, interaction and communication between the FDA and the sponsor of the trial can help to identify the most efficient path for clinical development while minimizing the number of patients placed in ineffective control regimens. Therapies designated as breakthrough therapies by the FDA may also be eligible for priority review and accelerated approval. Designation as a breakthrough therapy is within the discretion of the FDA. Accordingly, even if we believe one of our product candidates meets the criteria for designation as a breakthrough therapy, the FDA may disagree and instead determine not to make such designation. In any event, the receipt of a Breakthrough Therapy Designation for a product candidate may not result in a faster development process, review or approval compared to therapies considered for approval under conventional FDA procedures and does not assure ultimate approval by the FDA. In addition, even if one or more of our product candidates qualify as breakthrough therapies, the FDA may later decide that such product candidates no longer meet the conditions for qualification.

We may seek Fast Track Designation for some of our product candidates. If a therapy is intended for the treatment of a serious or life-threatening condition and the therapy demonstrates the potential to address unmet medical needs for this condition, the therapy sponsor may apply for Fast Track Designation. The FDA has broad discretion whether or not to grant this designation, so even if we believe a particular product candidate is eligible for this designation; we cannot assure our stockholders that the FDA would decide to grant it. Even if we do receive Fast Track Designation, we may not experience a faster development process, review or approval compared to conventional FDA procedures. The FDA may withdraw Fast Track Designation if it believes that the designation is no longer supported by data from our clinical development program. Fast Track Designation alone does not guarantee qualification for the FDA's priority review procedures.

We may seek Regenerative Medicine Advanced Therapy, or RMAT, designation for one or more of our product candidates. In 2017, the FDA established the RMAT designation as part of its implementation of the 21st Century Cures Act to expedite review of any drug that meets the following criteria: it qualifies as a RMAT, which is defined as a cell therapy, therapeutic tissue engineering product, human cell and tissue product, or any combination product using such therapies or products, with limited exceptions; it is intended to treat, modify, reverse, or cure a serious or life-threatening disease or condition; and preliminary clinical evidence indicates that the drug has the potential to address unmet medical needs for such a disease or condition. Like Breakthrough Therapy Designation, RMAT designation provides potential benefits that include more frequent meetings with the FDA to discuss the development plan for the product candidate, and eligibility for rolling review and priority review. Products granted RMAT designation may also be eligible for accelerated approval on the basis of a surrogate or intermediate endpoint reasonably likely to predict long-term clinical benefit, or reliance upon data obtained from a meaningful number of sites, including through expansion to additional sites. RMAT-designated products that receive accelerated approval may, as appropriate, fulfill their post-approval requirements through the submission of clinical evidence, clinical trials, patient registries, or other sources of real world evidence, such as electronic health records; through the collection of larger confirmatory data sets; or via post-approval monitoring of all patients treated with such therapy prior to approval of the therapy. There is no assurance that we will be able to obtain RMAT designation for any of our product candidates. RMAT designation does not change the FDA's standards for product approval, and there is no assurance that such designation will result in expedited review or approval or that the approved indication will not be narrower than the indication covered by the designation. Additionally, RMAT designation can be revoked if the criteria for eligibility cease to be met as clinical data emerges.

We may seek priority review designation for one or more of our other product candidates, but we might not receive such designation, and even if we do, such designation may not lead to a faster development or regulatory review or approval process.

If the FDA determines that a product candidate offers a treatment for a serious condition and, if approved, the product would provide a significant improvement in safety or effectiveness, the FDA may designate the product candidate for priority review. A priority review designation means that the goal for the FDA to review an application is six months, rather than the standard review period of ten months. We may request priority review for our product candidates. The FDA has broad discretion with respect to whether or not to grant priority review status to a product candidate, so even if we believe a particular product candidate is eligible for such designation or status, the FDA may decide not to grant it.

Moreover, a priority review designation does not necessarily result in expedited development or regulatory review or approval process or necessarily confer any advantage with respect to approval compared to conventional FDA procedures. Receiving priority review from the FDA does not guarantee approval within the six-month review cycle or at all.

Our product candidates may face competition from biosimilars approved through an abbreviated regulatory pathway.

The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively the ACA, includes a subtitle called the Biologics Price Competition and Innovation Act of 2009, or BPCIA, which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-approved reference biological product. Under the BPCIA, an application for a biosimilar product may not be submitted to the FDA until four years following the date that the reference product was first approved by the FDA. In addition, the approval of a biosimilar product may not be made effective by the FDA until 12 years from the date on which the reference product was first approved. During this 12-year period of exclusivity, another company may still market a competing version of the reference product if the FDA approves a BLA for the competing product containing the sponsor's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate the safety, purity, and potency of the other company's product. The law is complex and is still being interpreted and implemented by the FDA. As a result, its ultimate impact, implementation, and meaning are subject to uncertainty.

We believe that any of our product candidates approved as a biological product under a BLA should qualify for the 12-year period of exclusivity. However, there is a risk that this exclusivity could be shortened due to congressional action or otherwise, or that the FDA will not consider our investigational medicines to be reference products for competing products, potentially creating the opportunity for generic competition sooner than anticipated. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. Moreover, the extent to which a biosimilar, once approved, will be substituted for any one of our reference products in a way that is similar to traditional generic substitution for non-biological products is not yet clear, and will depend on a number of marketplace and regulatory factors that are still developing.

We may fail to obtain and maintain orphan drug designations from the FDA for our current and future product candidates, as applicable.

Our strategy includes filing for orphan drug designation where available for our product candidates. Under the Orphan Drug Act, the FDA may grant orphan drug designation to a drug or biologic intended to treat a rare disease or condition, which is defined as one occurring in a patient population of fewer than 200,000 in the United States, or a patient population greater than 200,000 in the United States where there is no reasonable expectation that the cost of developing the drug or biologic will be recovered from sales in the United States. In the United States, orphan drug designation entitles a party to financial incentives, such as opportunities for grant funding toward clinical trial costs, tax advantages and user-fee waivers. In addition, if a product that has orphan drug designation subsequently receives the first FDA approval for the disease for which it has such designation, the product is entitled to orphan drug exclusivity, which means that the FDA may not approve any other applications, including a full new drug application, or NDA, or BLA, to market the same drug or biologic for the same indication for seven years, except in limited circumstances, such as a showing of clinical superiority to the product with orphan drug exclusivity or where the original manufacturer is unable to assure sufficient product quantity.

On August 3, 2017, Congress passed the FDA Reauthorization Act of 2017, or the FDARA. The FDARA, among other things, codified the FDA's preexisting regulatory interpretation, to require that a drug sponsor demonstrate the clinical superiority of an orphan drug that is otherwise the same as a previously approved drug for the same rare disease in order to receive orphan drug exclusivity. The law reverses prior precedent holding that the Orphan Drug Act unambiguously requires that the FDA recognize the orphan exclusivity period regardless of a showing of clinical superiority. Moreover, in the Consolidated Appropriations Act of 2021, Congress did not further change this interpretation when it clarified that the interpretation codified in FDARA would apply in cases where the FDA issued an orphan designation before the enactment of FDARA but where product approval came after the enactment of FDARA. The FDA may further reevaluate the Orphan Drug Act and its regulations and policies. We do not know if, when, or how the FDA may change the orphan drug regulations and policies in the future, and it is uncertain how any changes might affect our business.

Depending on what changes the FDA may make to its orphan drug regulations and policies, our business could be adversely impacted.

In addition, exclusive marketing rights in the United States may be limited if we seek approval for an indication broader than the orphan-designated indication or may be lost if the FDA later determines that the request for designation was materially defective or if we are unable to assure sufficient quantities of the product to meet the needs of patients with the orphan-designated disease or condition. Further, even if we obtain orphan drug exclusivity for a product, that exclusivity may not effectively protect the product from competition because different drugs with different active moieties may receive and be approved for the same condition, and only the first applicant to receive approval will receive the benefits of marketing exclusivity. Even after an orphan-designated product is approved, the FDA can subsequently approve a later drug with the same active moiety for the same condition if the FDA concludes that the later drug is clinically superior if it is shown to be safer, more effective or makes a major contribution to patient care. Orphan drug designation neither shortens the development time or regulatory review time of a drug, nor gives the drug any advantage in the regulatory review or approval process. In addition, while we may seek orphan drug designation for our product candidates, we may never receive such designations.

Even if we receive regulatory approval of any product candidates or therapies, we will be subject to ongoing regulatory obligations and continued regulatory review, which may result in significant additional expense and we may be subject to penalties if we fail to comply with regulatory requirements or experience unanticipated problems with our product candidates.

If any of our product candidates are approved, they will be subject to ongoing regulatory requirements for manufacturing, labeling, packaging, storage, advertising, promotion, sampling, record-keeping, export, import, conduct of post-marketing studies and submission of safety, efficacy and other post-market information, including both federal and state requirements in the United States and requirements of comparable foreign regulatory authorities. In addition, we will be subject to continued compliance with cGMP and GCP requirements for any clinical trials that we conduct post-approval.

Manufacturers and manufacturers' facilities are required to comply with extensive FDA, and comparable foreign regulatory authority requirements, including ensuring that quality control and manufacturing procedures conform to cGMP regulations and applicable product tracking and tracing requirements. As such, we and any contract manufacturers we may engage will be subject to continual review and inspections to assess compliance with cGMP and adherence to commitments made in any BLA, other marketing application, and previous responses to inspection observations. Accordingly, we and others with whom we work must continue to expend time, money, and effort in all areas of regulatory compliance, including manufacturing, production and quality control.

Any regulatory approvals that we receive for our product candidates may be subject to limitations on the approved indicated uses for which the product may be marketed or to the conditions of approval, or contain requirements for potentially costly post-marketing testing, including Phase 4 clinical trials and surveillance to monitor the safety and efficacy of the product candidate. The FDA may also require a risk evaluation and mitigation strategies, or REMS, program as a condition of approval of our product candidates, which could entail requirements for long-term patient follow-up, a medication guide, physician communication plans or additional elements to ensure safe use, such as restricted distribution methods, patient registries and other risk minimization tools. In addition, if the FDA or a comparable foreign regulatory authority approves our product candidates, we will have to comply with requirements including submissions of safety and other post-marketing information and reports and registration.

The FDA may impose consent decrees or withdraw approval if compliance with regulatory requirements and standards is not maintained or if problems occur after the product reaches the market. Later discovery of previously unknown problems with our product candidates, including adverse events of unanticipated severity or frequency, or with our third-party manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may result in revisions to the approved labeling to add new safety information; imposition of post-market studies or clinical trials to

assess new safety risks; or imposition of distribution restrictions or other restrictions under a REMS program. Other potential consequences include, among other things:

- restrictions on the marketing or manufacturing of our products, withdrawal of the product from the market or voluntary or mandatory product recalls;
- fines, warning letters or holds on clinical trials;
- refusal by the FDA to approve pending applications or supplements to approved applications filed by us or suspension or revocation of license approvals;
- product seizure or detention or refusal to permit the import or export of our product candidates; and
- injunctions or the imposition of civil or criminal penalties.

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

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

We also cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative or executive action, either in the United States or abroad. For example, certain policies of the current administration in the United States may impact our business and industry. Namely, the current administration has taken several executive actions, including the issuance of a number of executive orders, that could impose significant burdens on, or otherwise materially delay, the FDA's ability to engage in routine regulatory and oversight activities, such as implementing statutes through rulemaking, issuance of guidance and review and approval of marketing applications. It is difficult to predict how these executive actions, including any executive orders, will be implemented, and the extent to which they will impact the FDA's ability to exercise its regulatory authority. If these executive actions impose constraints on the FDA's ability to engage in oversight and implementation activities in the normal course, our business may be negatively impacted.

Healthcare insurance coverage and reimbursement may be limited or unavailable in certain market segments for our product candidates, if approved, which could make it difficult for us to sell any product candidates or therapies profitably.

The success of our product candidates, if approved, depends on the availability of adequate coverage and reimbursement from third-party payors. In addition, because our product candidates represent new approaches to the treatment of the diseases they target, we cannot be sure that coverage and reimbursement will be available for, or accurately estimate the potential revenue from, our product candidates or assure that coverage and reimbursement will be available for any product that we may develop.

Patients who are provided medical treatment for their conditions generally rely on third-party payors to reimburse all or part of the costs associated with their treatment. Adequate coverage and reimbursement from governmental healthcare programs, such as Medicare and Medicaid, and commercial payors are critical to new product acceptance.

Government authorities and third-party payors, such as private health insurers and health maintenance organizations, decide which drugs and treatments they will cover and the amount of reimbursement. Coverage and reimbursement by a

third-party payor may depend upon a number of factors, including the third-party payor's determination that use of a product is:

- a covered benefit under its health plan;
- safe, effective and medically necessary;
- appropriate for the specific patient;
- cost-effective; and
- neither experimental nor investigational.

In the United States, the principal decisions about reimbursement for new medicines are typically made by the Centers for Medicare & Medicaid Services, the agency responsible for administering the Medicare program, or CMS. CMS decides whether and to what extent a new medicine will be covered and reimbursed under Medicare, and private payors tend to follow CMS to a substantial degree. That being said, however, no uniform policy of coverage and reimbursement for products exists among third-party payors. As a result, obtaining coverage and reimbursement approval of a product from a government or other third-party payor is a time-consuming and costly process that could require us to provide to each payor supporting scientific, clinical and cost-effectiveness data for the use of our products on a payor-by-payor basis, with no assurance that coverage and adequate reimbursement will be obtained. Even if we obtain coverage for a given product, the resulting reimbursement payment rates might not be adequate for us to achieve or sustain profitability or may require co-payments that patients find unacceptably high, which may adversely impact physicians' willingness to prescribe and treat. Further, even if one payor provides coverage for a given product, other payors may not provide coverage for that product. Additionally, third-party payors may not cover, or provide adequate reimbursement for, long-term follow-up evaluations required following the use of product candidates. 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. Because our product candidates may have a higher cost of goods than conventional therapies, and may require long-term follow-up evaluations, the risk that coverage and reimbursement rates may be inadequate for us to achieve profitability may be greater. There is significant uncertainty related to insurance coverage and reimbursement of newly approved products and coverage may be more limited than the purposes for which the medicine is approved by the FDA or comparable foreign regulatory authorities. It is difficult to predict at this time what third-party payors will decide with respect to the coverage and reimbursement for our product candidates.

Payment methodologies may be subject to changes in healthcare legislation and regulatory initiatives. For example, the Middle Class Tax Relief and Job Creation Act of 2012 required that the CMS reduce the Medicare clinical laboratory fee schedule by 2% in 2013, which served as a base for 2014 and subsequent years. In addition, effective January 1, 2014, CMS also began bundling the Medicare payments for certain laboratory tests ordered while a patient received services in a hospital outpatient setting. Additional state and federal healthcare reform measures are expected to be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for certain pharmaceutical products or additional pricing pressures.

Moreover, increasing efforts by governmental and third-party payors in the United States and abroad to cap or reduce healthcare costs may cause such organizations to limit both coverage and the level of reimbursement for newly approved products and, as a result, they may not cover or provide adequate payment for our product candidates. Increasingly, third-party payors are requiring that drug companies provide them with predetermined discounts from list prices and are challenging the prices charged for medical products. We cannot be sure that reimbursement will be available for any product candidate that we commercialize and, if reimbursement is available, the level of reimbursement. There has been increasing legislative and enforcement interest in the United States with respect to specialty drug pricing practices. Specifically, there have been several recent U.S. Congressional inquiries and proposed federal and state legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under Medicare, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs.

At a federal level, President Biden signed an Executive Order on July 9, 2021 affirming the administration's policy to (i) support legislative reforms that would lower the prices of prescription drug and biologics, including by allowing Medicare to negotiate drug prices, by imposing inflation caps, and, by supporting the development and market entry of lower-cost generic drugs and biosimilars; and (ii) support the enactment of a public health insurance option. Among other things, the Executive Order also directs HHS to provide a report on actions to combat excessive pricing of prescription drugs, enhance the domestic drug supply chain, reduce the price that the Federal government pays for drugs, and address price gouging in the industry; and directs the FDA to work with states and Indian Tribes that propose to develop section 804 Importation Programs in accordance with the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, and the FDA's implementing regulations. FDA released such implementing regulations on September 24, 2020, which went into effect on November 30, 2020, providing guidance for states to build and submit importation plans for drugs from Canada. Further, on November 20, 2020 CMS issued an Interim Final Rule implementing the Most Favored Nation, or MFN, Model under which Medicare Part B reimbursement rates will be calculated for certain drugs and biologicals based on the lowest price drug manufacturers receive in Organization for Economic Cooperation and Development countries with a similar gross domestic product per capita. The MFN Model regulations mandate participation by identified Part B providers and would have applied to all U.S. states and territories for a seven-year period beginning January 1, 2021 and ending December 31, 2027. The MFN is currently subject to ongoing litigation. Further, authorities in Canada have passed rules designed to safeguard the Canadian drug supply from shortages. If implemented, importation of drugs from Canada and the MFN Model may materially and adversely affect the price we receive for any of our product candidates. Additionally, on December 2, 2020, HHS published 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 rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers. on December 2, 2020, HHS published 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 rule also creates a new safe harbor for price reductions reflected at the point-of-sale, as well as a safe harbor for certain fixed fee arrangements between pharmacy benefit managers and manufacturers. Further, implementation of this change and new safe harbors for point-of-sale reductions in price for prescription pharmaceutical products and pharmacy benefit manager service fees are currently under review by the Biden administration and may be amended or repealed. Although a number of these and other proposed measures may require authorization through additional legislation to become effective, and the Biden administration may reverse or otherwise change these measures, both the Biden administration and Congress have indicated that it will continue to seek new legislative measures to control drug costs.

At the state level, legislatures are increasingly passing legislation and implementing regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. We expect to experience pricing pressures in connection with the sale of any of our product candidates due to the trend toward managed healthcare, the increasing influence of health maintenance organizations, cost containment initiatives and additional legislative changes. We may face competition in the United States for our development candidates and investigational medicines, if approved, from therapies sourced from foreign countries that have placed price controls on pharmaceutical products. In the United States, the FDA issued a final guidance document outlining a pathway for manufacturers to obtain an additional National Drug Code, or NDC, for an FDA-approved drug that was originally intended to be marketed in a foreign country and that was authorized for sale in that foreign country. The market implications of the final guidance are unknown at this time. Proponents of drug reimportation may attempt to pass legislation that would directly allow reimportation under certain circumstances. Legislation or regulations allowing the reimportation of drugs, if enacted, could decrease the price we receive for any products that we may develop and adversely affect our future revenues and prospects for profitability.

Disruptions at the FDA, the SEC and other government agencies caused by funding shortages or global health concerns could hinder their ability to hire and retain key leadership and other personnel, prevent new products and services from being developed or commercialized in a timely manner or otherwise prevent those agencies from performing normal business functions on which the operation of our business may rely, which could negatively impact our business.

The ability of the FDA to review and approve new products can be affected by a variety of factors, including government budget and funding levels, ability to hire and retain key personnel and accept the payment of user fees, and statutory, regulatory, and policy changes. Average review times at the agency have fluctuated in recent years as a result. In addition, government funding of the SEC and other government agencies on which our operations may rely, including those that fund research and development activities, is subject to the political process, which is inherently fluid and unpredictable.

Disruptions at the FDA and other agencies may also slow the time necessary for new drugs or biologics to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years, including most recently from December 22, 2018 to January 25, 2019, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA and the SEC, have had to furlough critical FDA, SEC and other government employees and stop critical activities. If a prolonged government shutdown occurs, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business.

Since March 2020, when foreign and domestic inspections of facilities were largely placed on hold, the FDA has been working to resume routine surveillance, bioresearch monitoring and pre-approval inspections on a prioritized basis. The FDA has developed a rating system to assist in determining when and where it is safest to conduct prioritized domestic inspections. As of May 2021, certain inspections, such as foreign preapproval, surveillance, and for-cause inspections that are not deemed mission-critical, remain temporarily postponed. In April 2021, the FDA issued guidance for industry formally announcing plans to employ remote interactive evaluations, using risk management methods, to meet user fee commitments and goal dates and in May 2021 announced plans to continue progress toward resuming standard operational levels. Should FDA determine that an inspection is necessary for approval and an inspection cannot be completed during the review cycle due to restrictions on travel, and the FDA does not determine a remote interactive evaluation to be adequate, FDA has stated that it generally intends to issue a complete response letter or defer action on the application until an inspection can be completed. Further, if there is inadequate information to make a determination on the acceptability of a facility, FDA may defer action on the application until an inspection can be completed. In 2020 and 2021, a number of companies announced receipt of complete response letters due to the FDA's inability to complete required inspections for their applications. Regulatory authorities outside the U.S. may adopt similar restrictions or other policy measures in response to the COVID-19 pandemic and may experience delays in their regulatory activities.

European Union drug marketing and reimbursement regulations may materially affect our ability to market and receive coverage for our products in the European Member States.

We intend to seek approval to market our product candidates in both the United States and in selected foreign jurisdictions. If we obtain approval in one or more foreign jurisdictions for our product candidates, we will be subject to rules and regulations in those jurisdictions. In some foreign countries, particularly certain countries in the European Union, the pricing of pharmaceutical products is subject to governmental control and other market regulations which could put pressure on the pricing and usage of our product candidates. In these countries, pricing negotiations with governmental authorities can take considerable time after obtaining marketing approval of a product candidate. In addition, market acceptance and sales of our product candidates will depend significantly on the availability of adequate coverage and reimbursement from third-party payors for our product candidates and may be affected by existing and future healthcare reform measures.

Much like the Anti-Kickback Statute prohibition in the United States, the provision of benefits or advantages to physicians to induce or encourage the prescription, recommendation, endorsement, purchase, supply, order or use of medicinal products is also prohibited in the European Union. The provision of benefits or advantages to induce or reward improper performance generally is typically governed by the national anti-bribery laws of European Union Member

States, and the Bribery Act 2010 in the United Kingdom. Infringement of these laws could result in substantial fines and imprisonment. EU Directive 2001/83/EC, which is the EU Directive governing medicinal products for human use, further provides that, where medicinal products are being promoted to persons qualified to prescribe or supply them, no gifts, pecuniary advantages or benefits in kind may be supplied, offered or promised to such persons unless they are inexpensive and relevant to the practice of medicine or pharmacy. This provision has been transposed into the Human Medicines Regulations 2012 and so remains applicable in the United Kingdom despite its departure from the European Union.

Payments made to physicians in certain European Union Member States must be publicly disclosed. Moreover, agreements with physicians often must be the subject of prior notification and approval by the physician's employer, his or her competent professional organization and/or the regulatory authorities of the individual European Union Member States. These requirements are provided in the national laws, industry codes or professional codes of conduct, applicable in the European Union Member States. Failure to comply with these requirements could result in reputational risk, public reprimands, administrative penalties, fines or imprisonment.

In addition, in some foreign countries, including the European Economic Area, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing and reimbursement vary widely from country to country. For example, the European Union 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. Reference pricing used by various European Union Member States and parallel distribution, or arbitrage between low-priced and high-priced Member States, can further reduce prices. Other European Union Member States allow companies to fix their own prices for drug products, but monitor and control prescription volumes and issue guidance to physicians to limit prescriptions. Instead of approving a specific price for a medicinal product, a Member State may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market. In some countries, we may be required to conduct a clinical trial or other studies that compare the cost-effectiveness of any of our product candidates to other available therapies in order to obtain or maintain reimbursement or pricing approval. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any of our products. Historically, products launched in the European Union do not follow price structures of the United States and generally prices tend to be significantly lower. Publication of discounts by third-party payors or authorities may lead to further pressure on the prices or reimbursement levels within the country of publication and other countries. If pricing is set at unsatisfactory levels or if reimbursement of our products is unavailable or limited in scope or amount, our revenues from sales by us or our strategic partners and the potential profitability of any of our product candidates in those countries would be negatively affected.

Data collection in Europe and some U.S. states is governed by restrictive regulations governing the use, processing, and cross-border transfer of personal information.

The collection, use, storage, disclosure, transfer or other processing of personal data, including personal health data in the European Union, or EU, is governed by the GDPR as of May 25, 2018.

The GDPR imposes a broad range of strict requirements on companies subject to the GDPR, such as including requirements relating to having legal bases for processing personal information relating to identifiable individuals and transferring such information outside the European Economic Area, or the EEA, including to the United States, providing details to those individuals regarding the processing of their personal information, implementing safeguards to keep personal information secure, having data processing agreements with third parties who process personal information, providing information to individuals regarding data processing activities, responding to individuals' requests to exercise their rights in respect of their personal information, obtaining consent of the individuals to whom the personal data relates, reporting security and privacy breaches involving personal data to the competent national data protection authority and affected individuals, appointing data protection officers, conducting data protection impact assessments, and record-keeping. The GDPR also imposes strict rules on the transfer of personal data to countries outside the EEA, including the United States. It substantially increases the penalties to which we could be subject in the event of any non-compliance, including fines of up to 10 million Euros or up to 2% of our total worldwide annual turnover for certain comparatively minor offenses, or up to 20 million Euros or up to 4% of our total worldwide annual

turnover for more serious offenses. The GDPR also confers a private right of action on data subjects and consumer associations to lodge complaints with supervisory authorities, seek judicial remedies, and obtain compensation for damages resulting from violations of the GDPR. In addition, the GDPR includes restrictions on cross-border data transfers.

In addition, further to the United Kingdom's, or the UK's, exit from the EU on January 31, 2020, the GDPR ceased to apply in the UK at the end of the transition period on December 31, 2020. However, as of January 1, 2021, the UK's European Union (Withdrawal) Act 2018 incorporated the GDPR (as it existed on December 31, 2020 but subject to certain UK specific amendments) into UK law, referred to as the UK GDPR. The UK GDPR and the UK Data Protection Act 2018 set out the UK's data protection regime, which is independent from but aligned to the EU's data protection regime. Non-compliance with the UK GDPR may result in monetary penalties of up to £17.5 million or 4% of worldwide revenue, whichever is higher. The UK is now regarded as a third country under the EU's GDPR but the European Commission has now issued a decision recognizing the UK as providing adequate protection under the EU GDPR and, therefore, transfers of personal data originating in the EU to the UK remain unrestricted. Like the EU GDPR, the UK GDPR restricts personal data transfers outside the UK to countries not regarded by the UK as providing adequate protection (this means that personal data transfers from the UK to the EEA remain free flowing).

If we begin conducting trials in the EEA or the UK, we must also ensure that we maintain adequate safeguards to enable the transfer of personal data outside of the EEA or the UK, in particular to the United States in compliance with European data protection laws including the GDPR and UK GDPR. We expect that we will continue to face uncertainty as to whether our efforts to comply with our obligations under European privacy laws will be sufficient. If we are investigated by a European data protection authority, we may face fines and other penalties. Any such investigation or charges by European data protection authorities could have a negative effect on our existing business and on our ability to attract and retain new clients or pharmaceutical partners. We may also experience hesitancy, reluctance, or refusal by European, UK or multi-national clients or pharmaceutical partners to continue to use our products and solutions due to the potential risk exposure as a result of the current (and, in particular, future) data protection obligations imposed on them by certain data protection authorities in interpretation of current law, including the GDPR and UK GDPR. Such clients or pharmaceutical partners may also view any alternative approaches to compliance as being too costly, too burdensome, too legally uncertain, or otherwise objectionable and therefore decide not to do business with us. Any of the foregoing could materially harm our business, prospects, financial condition and results of operations.

Laws and regulations governing any international operations we may have in the future may preclude us from developing, manufacturing and selling certain products outside of the United States and require us to develop and implement costly compliance programs.

If we expand our operations outside of the United States, we must dedicate additional resources to comply with numerous laws and regulations in each jurisdiction in which we plan to operate. The FCPA prohibits any U.S. individual or business from paying, offering, authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the United States to comply with certain accounting provisions requiring the company to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations.

Compliance with the FCPA is expensive and difficult, particularly in countries in which corruption is a recognized problem. In addition, the FCPA presents particular challenges in the pharmaceutical industry, because, in many countries, hospitals are operated by the government, and doctors and other hospital employees are considered foreign officials. Certain payments to hospitals in connection with clinical trials and other work have been deemed to be improper payments to government officials and have led to FCPA enforcement actions.

Various laws, regulations and executive orders also restrict the use and dissemination outside of the United States, or the sharing with certain non-U.S. nationals, of information classified for national security purposes, as well as certain products and technical data relating to those products. If we expand our presence outside of the United States, it will require us to dedicate additional resources to comply with these laws, and these laws may preclude us from developing,

manufacturing, or selling certain products and product candidates outside of the United States, which could limit our growth potential and increase our development costs.

The failure to comply with laws governing international business practices may result in substantial civil and criminal penalties and suspension or debarment from government contracting. The SEC also may suspend or bar issuers from trading securities on U.S. exchanges for violations of the FCPA's accounting provisions.

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

Changes in regulations, statutes or the interpretation of existing regulations could impact our business in the future by requiring, for example: (i) changes to our manufacturing arrangements; (ii) additions or modifications to product labeling; (iii) the recall or discontinuation of our products; or (iv) additional record-keeping requirements. If any such changes were to be imposed, they could adversely affect the operation of our business.

Patients who are provided medical treatment for their conditions generally rely on third-party payors to reimburse all or part of the costs associated with their treatment. Adequate coverage and reimbursement from governmental healthcare programs, such as Medicare and Medicaid, and commercial payors is critical to new product acceptance. Our ability to commercialize any products successfully, if approved, also will depend in part on the extent to which coverage and adequate reimbursement for these products and related treatments will be available from government health administration authorities, private health insurers and other organizations. In the United States, there have been and continue to be a number of legislative initiatives to contain healthcare costs. For example, in March 2010, the Patient Protection and Affordable Care Act, or the ACA, was passed, which substantially changes the way healthcare is financed by both governmental and private insurers, and significantly impacts the U.S. pharmaceutical industry. The ACA, among other things, subjects biological products to potential competition by lower-cost biosimilars, addresses a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected, increases the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program and extends the rebate program to individuals enrolled in Medicaid managed care organizations, establishes annual fees and taxes on manufacturers of certain branded prescription drugs, and creates a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 70% (increased pursuant to the Bipartisan Budget Act of 2018, effective as of 2019) 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.

Since its enactment, there have been numerous judicial, administrative, executive and legislative challenges to certain aspects of the ACA. On June 17, 2021, the U.S. Supreme Court dismissed the most recent judicial challenge to the ACA brought by several states without specifically ruling on the constitutionality of the ACA. Prior to the Supreme Court's decision, President Biden issued an Executive Order to initiate a special enrollment period from February 15, 2021 through August 15, 2021 for purposes of obtaining health insurance coverage through the ACA marketplace. 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 unclear how other healthcare reform measures of the Biden administrations or other efforts, if any, to challenge repeal or replace the ACA, will impact our business.

Other legislative changes have been proposed and adopted in the United States since the ACA was enacted. In August 2011, the Budget Control Act of 2011, among other things, created measures for spending reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions of Medicare payments to providers up to 2% per fiscal year, and, due to subsequent legislative amendments, will remain in effect through 2030 unless additional Congressional action is taken. However, pursuant to the Coronavirus Aid, Relief and Economic Security Act, or CARES Act, and subsequent litigation, these Medicare sequester reductions will be suspended from

May 1, 2020 through December 31, 2021 due to the COVID-19 pandemic. Proposed legislation, if passed, would extend this suspension until the end of the pandemic.

On May 30, 2018, the Right to Try Act was signed into law. The law, among other things, provides a federal framework for certain patients to access certain investigational new drug products that have completed a Phase I clinical trial and that are undergoing investigation for FDA approval. Under certain circumstances, eligible patients can seek treatment without enrolling in clinical trials and without obtaining FDA permission under the FDA expanded access program. While there is no obligation for a drug manufacturer to make its drug products available to eligible patients under the Right to Try Act, the Cures Act requires the manufacturer to develop a policy for evaluating and responding to patient requests for expanded access. This policy must be made public and readily available, and must include company contact information and expected response times. We expect that additional foreign, federal and state healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in limited coverage and reimbursement and reduced demand for our products, once approved, or additional pricing pressures.

In May 2019, CMS issued a final rule to allow Medicare Advantage Plans the option of using step therapy, a type of prior authorization, for Part B drugs beginning January 1, 2020. This final rule codified CMS's policy change that was effective January 1, 2019. However, it is unclear whether the Biden administration will challenge, reverse, revoke or otherwise modify these executive and administrative actions after January 20, 2021.

These laws, and future state and federal healthcare reform measures may be adopted in the future, any of which may result in additional reductions in Medicare and other healthcare funding and otherwise affect the prices we may obtain for any of our product candidates for which we may obtain regulatory approval or the frequency with which any such product candidate is prescribed or used.

Risks related to our intellectual property

If we are unable to obtain and maintain patent protection for any product candidates we develop or for our RED PLATFORM, our competitors could develop and commercialize products or technology similar or identical to ours, and our ability to successfully commercialize any product candidates we may develop, and our technology may be adversely affected.

Our success depends in large part on our ability to obtain and maintain patent protection in the United States and other countries with respect to our product candidates, RED PLATFORM and other technologies we may develop. We seek to protect our proprietary position by in-licensing intellectual property and filing patent applications in the United States and abroad relating to our product candidates and RED PLATFORM, as well as other technologies that are important to our business. Given that the development of our technology and product candidates is at an early stage, our intellectual property portfolio with respect to certain aspects of our technology and product candidates is also at an early stage. For example, although we own issued patents related to RTX-240, RTX-321 and RTX-224, there can be no assurance that we will secure issued patents for additional product candidates. We have filed or intend to file patent applications directed to the composition of matter of our product candidates and various processes of our RED PLATFORM; however, there can be no assurance that any such patent applications will issue as granted patents. Furthermore, in some cases, we have only filed provisional patent applications on certain aspects of our technology and product candidates and each of these provisional patent applications is not eligible to become an issued patent until, among other things, we file a non-provisional patent application within 12 months of the filing date of the applicable provisional patent application. Any failure to file a non-provisional patent application within this timeline could cause us to lose the ability to obtain patent protection for the inventions disclosed in the associated provisional patent applications.

Composition of matter patents for biological and pharmaceutical products are generally considered to be the strongest form of intellectual property protection for those types of products, as such patents provide protection without regard to any method of use. Although we have secured issued United States composition of matter patents related to RTX-240, RTX-321 and RTX-224, we cannot be certain that the claims in our pending patent applications covering the composition of matter of all of our product candidates will be considered patentable by the United States Patent and Trademark Office, or the USPTO, or by patent offices in foreign countries, or that the claims in any of our issued patents

will be considered valid and enforceable by courts in the United States or foreign countries. Furthermore, in some cases, we may not be able to obtain issued claims covering compositions of matter relating to our product candidates and RED PLATFORM, as well as other technologies that are important to our business, and instead may need to rely on filing patent applications with claims covering a method of use and/or method of manufacture. Method of use patents protect the use of a product for the specified method. This type of patent does not prevent a competitor from making and marketing a product that is identical to our product for an indication that is outside the scope of the patented method. Moreover, even if competitors do not actively promote their products for our targeted indications, physicians may prescribe these products "off-label" for those uses that are covered by our method of use patents. Although off-label prescriptions may infringe or contribute to the infringement of method of use patents, the practice is common and such infringement is difficult to prevent or prosecute. There can be no assurance that any such patent applications will issue as granted patents, and even if they do issue, such patent claims may be insufficient to prevent third parties, such as our competitors, from utilizing our technology. Any failure to obtain or maintain patent protection with respect to our product candidates and RED PLATFORM could have a material adverse effect on our business, financial condition, results of operations, and prospects.

The patent position of biotechnology and pharmaceutical companies generally is highly uncertain and involves complex legal and factual questions for which legal principles remain unsolved. The patent applications that we own or in-license may fail to result in issued patents with claims that cover our product candidates in the United States or in other foreign countries. There is no assurance that all potentially relevant prior art relating to our patents and patents applications has been found, which can invalidate a patent or prevent a patent from issuing from a pending patent application. Even if patents successfully issue, and even if such patents cover our product candidates, third parties may challenge their validity, enforceability, or scope, which may result in such patents being narrowed, found unenforceable or invalidated. Furthermore, even if they are unchallenged, our patents and patent applications may not adequately protect our intellectual property, provide exclusivity for our product candidates, or prevent others from designing around our claims. Any of these outcomes could impair our ability to prevent competition from third parties, which may have an adverse impact on our business.

We intend to rely on patent rights and the status of our product candidates, if approved, as products eligible for exclusivity under the Biologics Price Competition and Innovation Act (BPCIA). If we are unable to obtain or maintain exclusivity from the combination of these approaches, we may not be able to compete effectively in our markets.

We rely or will rely upon a combination of patents, trade secret protection, and confidentiality agreements to protect the intellectual property related to our technologies and product candidates. Our success depends in large part on our and our licensors' ability to obtain regulatory exclusivity and maintain patent and other intellectual property protection in the United States and in other countries with respect to our proprietary technology and products.

Even if we cannot obtain and maintain effective protection of exclusivity from our regulatory efforts and intellectual property rights, including patent protection, data exclusivity or orphan drug exclusivity for our product candidates, we believe that our product candidates will be protected by exclusivity that prevents approval of a biosimilar in the United States for a period of twelve years from the time the product to which it claims similarity was first approved. However, the Biologics Price Competition and Innovation Act of 2009, Title VII, Subtitle A of the Patent Protection and Affordable Care Act, Pub.L.No.111-148, 124 Stat.119, Sections 7001-02 signed into law March 23, 2010, and codified in 42 U.S.C. §262 (the BCPIA), created an elaborate and complex patent dispute resolution mechanism for biosimilars that could prevent us from launching our product candidates in the United States or could substantially delay such launches. Current biosimilars litigation are addressing certain requirements of the BPCIA which is creating uncertainty over how certain terms of the BPCIA should be construed and this presents uncertainty for both the biologics innovator and biosimilar party. The BPCIA mechanism required for biosimilar applicants may pose greater risk that patent infringement litigation will disrupt our activities and add increased expenses, as well as divert management's attention. If a biosimilar version of one of our product candidates were approved in the United States, it could have a negative effect on our business.

If any of our owned or in-licensed patent applications do not issue as patents in any jurisdiction, we may not be able to compete effectively.

Changes in either the patent laws or their interpretation in the United States and other countries may diminish our ability to protect our inventions, obtain, maintain, and enforce our intellectual property rights and, more generally, could affect the value of our intellectual property or narrow the scope of our owned and licensed patents. With respect to our patent portfolio, as of June 30, 2021, most of the patent rights that we own or in-license are currently pending patent applications, except that we own 13 issued U.S. patents and we have two in-licensed U.S. patents. With respect to both in-licensed and owned intellectual property, we cannot predict whether the patent applications we and our licensors are currently pursuing will issue as patents in any particular jurisdiction or whether the claims of any issued patents will provide sufficient protection from competitors or other third parties.

The patent prosecution process is expensive, time-consuming, and complex, and we may not be able to file, prosecute, maintain, enforce, or license all necessary or desirable patents and patent applications at a reasonable cost or in a timely manner. It is also possible that we will fail to identify patentable aspects of our research and development output in time to obtain patent protection. Although we enter into non-disclosure and confidentiality agreements with parties who have access to confidential or patentable aspects of our research and development output, such as our employees, corporate collaborators, outside scientific collaborators, contract research organizations, contract manufacturers, consultants, advisors and other third parties, any of these parties may breach such agreements and disclose such output before a patent application is filed, thereby jeopardizing our ability to seek patent protection. In addition, our ability to obtain and maintain valid and enforceable patents depends on whether the differences between our inventions and the prior art allow our inventions to be patentable over the prior art. Furthermore, 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. Therefore, we cannot be certain that we or our licensors were the first to make the inventions claimed in any of our owned or licensed patents or pending patent applications, or that we or our licensors were the first to file for patent protection of such inventions.

If the scope of any patent protection we obtain is not sufficiently broad, or if we lose any of our patent protection, our ability to prevent our competitors from commercializing similar or identical technology and product candidates would be adversely affected.

The patent position of biotechnology and pharmaceutical companies generally is highly uncertain, involves complex legal and factual questions, and has been the subject of much litigation in recent years. As a result, the issuance, scope, validity, enforceability, and commercial value of our patent rights are highly uncertain. Our owned or in-licensed pending and future patent applications may not result in patents being issued which protect our product candidates, RED PLATFORM technology, or other technologies or which effectively prevent others from commercializing competitive technologies and product candidates.

No consistent policy regarding the scope of claims allowable in patents in the biotechnology field has emerged in the United States. The patent situation outside of the United States is even more uncertain. Changes in either the patent laws or their interpretation in the United States and other countries may diminish our ability to protect our inventions and enforce our intellectual property rights, and more generally could affect the value of our intellectual property. In particular, our ability to stop third parties from making, using, selling, offering to sell, or importing products that infringe our intellectual property will depend in part on our success in obtaining and enforcing patent claims that cover our technology, inventions and improvements. With respect to both licensed and company-owned intellectual property, we cannot be sure that patents will be granted with respect to any of our pending patent applications or with respect to any patent applications filed by us in the future, nor can we be sure that any of our existing patents or any patents that may be granted to us in the future will be commercially useful in protecting our products, the use of our products, and the methods used to manufacture those products. Moreover, even our issued patents do not guarantee us the right to practice our technology in relation to the commercialization of our products. The area of patent and other intellectual property rights in biotechnology is an evolving one with many risks and uncertainties, and third parties may have blocking patents that could be used to prevent us from commercializing our patented product candidates and practicing our proprietary technology. Our issued patents and those that may issue in the future may be challenged, invalidated, or circumvented, which could limit our ability to stop competitors from marketing related products or limit the length of the term of patent

protection that we may have for our product candidates. In addition, the rights granted under any issued patents may not provide us with protection or competitive advantages against competitors with similar technology. Furthermore, our competitors may independently develop similar technologies. For these reasons, we may have competition for our product candidates. Moreover, because of the extensive time required for development, testing and regulatory review of a potential product, it is possible that, before any particular product candidate can be commercialized, any related patent may expire or remain in force for only a short period following commercialization, thereby reducing any advantage of the patent.

In addition, the coverage claimed in a patent application can be significantly reduced before the patent is issued, and its scope can be reinterpreted after issuance. Even if patent applications we own or license issue as patents, they may not issue in a form that will provide us with any meaningful protection, prevent competitors or other third parties from competing with us, or otherwise provide us with any competitive advantage. Any patents that we own or in-license may be challenged, narrowed, circumvented, or invalidated by third parties. Consequently, we do not know whether our product candidates, RED PLATFORM technologies or other technologies will be protectable or remain protected by valid and enforceable patents. Our competitors or other third parties may be able to circumvent our patents by developing similar or alternative technologies or products in a non-infringing manner which could materially adversely affect our business, financial condition, results of operations and prospects.

The issuance of a patent is not conclusive as to its inventorship, scope, validity, or enforceability, and patents that we own or license may be challenged in the courts or patent offices in the U.S. and abroad. We or our licensors may be subject to a third-party pre-issuance submission of prior art to the USPTO or to foreign patent authorities or become involved in opposition, derivation, revocation, reexamination, post-grant and *inter partes* review, or interference proceedings or other similar proceedings challenging our owned or licensed patent rights. An adverse determination in any such submission, proceeding or litigation could reduce the scope of, or invalidate or render unenforceable, our owned or in-licensed patent rights, allow third parties to commercialize our product candidates, RED PLATFORM technologies or other technologies and compete directly with us, without payment to us, or result in our inability to manufacture or commercialize products without infringing third-party patent rights. Moreover, we, or one of our licensors, may have to participate in interference proceedings declared by the USPTO to determine priority of invention or in post-grant challenge proceedings, such as oppositions in a foreign patent office, that challenge our or our licensor's priority of invention or other features of patentability with respect to our owned or in-licensed patents and patent applications. Such challenges may result in loss of patent rights, loss of exclusivity, or in patent claims being narrowed, invalidated, or held unenforceable, 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 product candidates, RED PLATFORM and other technologies. Such proceedings also may result in substantial cost and require significant time from our scientists and management, even if the eventual outcome is favorable to us.

In addition, given the amount of time required for the development, testing, and regulatory review of new product candidates, patents protecting such product candidates might expire before or shortly after such product candidates are commercialized. As a result, our intellectual property may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours.

We may, in the future, co-own patent rights relating to future product candidates and our RED PLATFORM with third parties. Some of our in-licensed patent rights are, and may in the future be, co-owned with third parties. In addition, our licensors may co-own the patent rights we in-license with other third parties with whom we do not have a direct relationship. Our exclusive rights to certain of these patent rights are dependent, in part, on inter-institutional or other operating agreements between the joint owners of such patent rights, who are not parties to our license agreements. For example, under our license agreement with the Whitehead Institute for Biomedical Research, or WIBR, as amended (or the WIBR License) we license certain patents rights co-owned by WIBR and Tufts University, or Tufts. Our rights to Tufts' interest in such patent rights depends on an inter-institutional agreement between WIBR and Tufts, pursuant to which WIBR controls the licensing of such patent rights. If our licensors do not have exclusive control of the grant of licenses under any such third-party co-owners' interest in such patent rights or we are otherwise unable to secure such exclusive rights, such co-owners may be able to license their rights to other third parties, including our competitors, and our competitors could market competing products and technology. In addition, we may need the cooperation of any such co-owners of our patent rights in order to enforce such patent rights against third parties, and such cooperation may not

be provided to us. Any of the foregoing could have a material adverse effect on our competitive position, business, financial conditions, results of operations, and prospects.

Our rights to develop and commercialize our product candidates and RED PLATFORM are subject, in part, to the terms and conditions of licenses granted to us by others.

We rely upon licenses to certain patent rights and proprietary technology from third parties that are important or necessary to the development of our product candidates and RED PLATFORM. For example, under the WIBR License, WIBR grants us an exclusive, worldwide, sublicensable license under four patent families to research, develop, make, and commercialize products and processes covered by such patent rights for all uses. The portfolio of patent rights licensed to us under the WIBR License is directed, in part, to the *in vitro* production of red blood cells, including the use of the enzyme sortase to conjugate a protein of interest to the cell surface. Patent rights that we in-license may be subject to a reservation of rights by one or more third parties. For example, our in-licensed patent rights from WIBR under the WIBR License were funded in part by the U.S. government. As a result, the U.S. government may have certain rights to such intellectual property. Furthermore, pursuant to a Defense Advanced Research Projects Agency Agreement between WIBR and a global biopharmaceutical company, the biopharmaceutical company funded research resulting in one of the patent families licensed to us under the WIBR License and retained a worldwide, irrevocable, non-exclusive, royalty-free right to use the inventions and technologies covered by this patent family for research and development purposes. WIBR also retains the right with respect to all four patent families licensed to us to (i) to practice the patent rights licensed under the agreement for research, teaching and educational purposes, including sponsored research and collaboration, and (ii) to grant non-exclusive licenses to academic and not-for-profit research institutes to practice under the patent rights for research, teaching and educational purposes (excluding sponsored research), while Tufts retains such rights only with respect to the patent family that it co-owns.

In addition, subject to the terms of any such license agreements, we do not have the right to control the preparation, filing, prosecution and maintenance, and we may not have the right to control the enforcement, and defense of patents and patent applications covering the technology that we license from third parties. For example, under the WIBR License, WIBR controls prosecution of the patent rights licensed to us, and we control enforcement of the patent rights. We cannot be certain that our in-licensed patent applications (and any patents issuing therefrom) that are controlled by our licensors will be prepared, filed, prosecuted, maintained, enforced, and defended in a manner consistent with the best interests of our business. If our licensors fail to prosecute, maintain, enforce, and defend such patents rights, or lose rights to those patent applications (or any patents issuing therefrom), the rights we have licensed may be reduced or eliminated, our right to develop and commercialize any of our product candidates and RED PLATFORM technologies that are subject of such licensed rights could be adversely affected, and we may not be able to prevent competitors from making, using and selling competing products. Moreover, we cannot be certain that such activities by our licensors have been or will be conducted in compliance with applicable laws and regulations or will result in valid and enforceable patents or other intellectual property rights. In addition, even where we have the right to control patent prosecution of patents and patent applications we have licensed from third parties, we may still be adversely affected or prejudiced by actions or inactions of our licensors and their counsel that took place prior to the date upon which we assumed control over patent prosecution. Finally, subject to the terms of any such license agreements, the licensor may be able to terminate the license without our consent. For example, under the WIBR License, WIBR may terminate the WIBR License upon written notice to us if we, along with our affiliates and sublicensees, cease to carry on business related to the WIBR License for more than six months. WIBR may also terminate the WIBR License for our material breach that remains uncured for sixty days after receiving notice thereof, if we fail to pay amounts due under the agreement within thirty days after receiving notice of such failure, or if we challenge the validity or enforceability of any of the licensed patent rights.

Some intellectual property may have been discovered through government funded programs and thus may be subject to federal regulations such as "march-in" rights, certain reporting requirements and a preference for U.S.-based companies. Compliance with such regulations may limit our exclusive rights and limit our ability to contract with non-U.S. manufacturers.

Our in-licensed patent rights from WIBR under the WIBR License were funded in part by the U.S. government and are therefore subject to certain federal regulations. When new technologies are developed with U.S. government funding, the

U.S. government generally obtains certain rights in any resulting patents, including a non-exclusive license authorizing the U.S. government to use the invention or to have others use the invention on its behalf. The U.S. government's rights may also permit it to disclose the funded inventions and technology to third parties and to exercise march-in rights to use or allow third parties to use the technology we have licensed that was developed using U.S. government funding. The U.S. government may exercise its march-in rights if it determines that action is necessary because we fail to achieve practical application of the government-funded technology, or because action is necessary to alleviate health or safety needs, to meet requirements of federal regulations, or to give preference to U.S. industry. In addition, our rights in such inventions may be subject to certain requirements to manufacture products embodying such inventions in the United States in certain circumstances and if this requirement is not waived. Any exercise by the U.S. government of such rights or by any third party of its reserved rights could have a material adverse effect on our competitive position, business, financial condition, results of operations, and prospects.

If we fail to comply with our obligations in the agreements under which we license intellectual property rights from third parties or otherwise experience disruptions to our business relationships with our licensors, we could lose license rights that are important to our business.

The WIBR License imposes, and we expect our future license agreements will impose, various development, diligence, commercialization, and other obligations on us in order to maintain the licenses. In spite of our efforts, WIBR or a future licensor might conclude that we have materially breached our obligations under such license agreements and seek to terminate the license agreements, thereby removing or limiting our ability to develop and commercialize products and technology covered by these license agreements. If these in-licenses are terminated, or if the underlying patent rights licensed thereunder fail to provide the intended exclusivity, competitors or other third parties would have the freedom to seek regulatory approval of, and to market, products identical to ours and we may be required to cease our development and commercialization of certain of our product candidates or of our current RED PLATFORM technologies. Any of the foregoing could have a material adverse effect on our competitive position, business, financial conditions, results of operations, and prospects.

Moreover, disputes may arise regarding intellectual property subject to a licensing agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- the sublicensing of patent and other rights under our collaborative development relationships;
- our diligence obligations under the license agreement and what activities satisfy those diligence obligations;
- the inventorship and ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us and our partners;
- whether and the extent to which inventors are able to contest the assignment of their rights to our licensors; and
- the priority of invention of patented technology.

The agreements under which we currently license intellectual property or technology from third parties are complex, and certain provisions in such agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology, or increase what we believe to be our financial or other obligations under the relevant agreement, either of which could have a material adverse effect on our business, financial condition, results of operations, and prospects. Moreover, if disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on commercially acceptable terms, we may be unable to continue to utilize our RED PLATFORM or successfully develop and commercialize the affected product candidates, which could have a material adverse effect on our business, financial conditions, results of operations, and prospects.

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

Filing, prosecuting, and defending patents on our product candidates, RED PLATFORM technologies and other technologies in all countries throughout the world would be prohibitively expensive, and the laws of foreign countries may not protect our rights to the same extent as the laws of the United States. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories where we have patent protection but enforcement is not as strong as that in the United States. These products may compete with our products, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents, trade secrets, and other intellectual property protection, particularly those relating to biotechnology products, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our intellectual property and proprietary rights generally. Proceedings to enforce our intellectual property and proprietary rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly, could put our patent applications at risk of not issuing, and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate, and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property and proprietary rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

Many countries have compulsory licensing laws under which a patent owner may be compelled to grant licenses to third parties. In addition, many countries limit the enforceability of patents against government agencies or government contractors. In these countries, the patent owner may have limited remedies, which could materially diminish the value of such patents. If we or any of our licensors is forced to grant a license to third parties with respect to any patents relevant to our business, our competitive position may be impaired, and our business, financial condition, results of operations, and prospects may be adversely affected.

Our inability to protect our intellectual property or failure to maintain the confidentiality and integrity of data or other sensitive company information, by cyber-attack or other event, could have a material adverse effect on our business.

Our success and competitive position are dependent in part upon our proprietary intellectual property. We rely on a combination of patents and trade secrets to protect our proprietary intellectual property, and we expect to continue to do so. Although we seek to protect our proprietary rights through a variety of means, we cannot guarantee that the protective steps we have taken are adequate to protect these rights. Patents issued to or licensed by us in the past or in the future may be challenged and held invalid. In addition, as our patents expire, we may be unsuccessful in extending their protection through patent term extensions. The expiration of, or the failure to maintain or extend our patents, could have a material adverse effect on us.

We also rely on confidentiality agreements with certain employees, consultants, and other third parties to protect, in part, trade secrets and other proprietary information. These agreements could be breached, and we may not have adequate remedies for such a breach. In addition, others could independently develop substantially equivalent proprietary information or gain access to our trade secrets or proprietary information.

Our intellectual property, other proprietary technology, and other sensitive company information is dependent on sophisticated information technology systems and is potentially vulnerable to cyber-attack, loss, damage, destruction from system malfunction, computer viruses, loss of data privacy, or misappropriation or misuse of it by those with permitted access, and other events. While we have invested to protect our intellectual property and other information,

and continue to upgrade and enhance our systems to keep pace with continuing changes in information processing technology, there can be no assurance that our precautionary measures will prevent breakdowns, breaches, cyber-attacks, or other events. Such events could have a material adverse effect on our reputation, financial condition, or results of operations.

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

Periodic maintenance fees, renewal fees, annuity fees, and various other government fees on patents and applications will be due to be paid to the USPTO and various government patent agencies outside of the United States over the lifetime of our owned or licensed patents and applications. In certain circumstances, we rely on our licensing partners to pay these fees due to U.S. and non-U.S. patent agencies. The USPTO and various non-U.S. government agencies require compliance with several procedural, documentary, fee payment, and other similar provisions during the patent application process. We are also dependent on our licensors to take the necessary action to comply with these requirements with respect to our licensed intellectual property. In some cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. There are situations, however, in which non-compliance can result in abandonment or lapse of the patent or patent application, resulting in a partial or complete loss of patent rights in the relevant jurisdiction. In such an event, potential competitors might be able to enter the market with similar or identical products or technology, which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

Changes in U.S. patent law could diminish the value of patents in general, thereby impairing our ability to protect our products.

Changes in either the patent laws or interpretation of the patent laws in the United States could increase the uncertainties and costs surrounding the prosecution of patent applications and the enforcement or defense of issued patents. Assuming that other requirements for patentability are met, prior to March 2013, in the United States, the first to invent the claimed invention was entitled to the patent, while outside the United States, the first to file a patent application was entitled to the patent. After March 2013, under the Leahy-Smith America Invents Act, or the America Invents Act, enacted in September 2011, the United States transitioned to a first inventor to file system in which, assuming that other requirements for patentability are met, the first inventor to file a patent application will be entitled to the patent on an invention regardless of whether a third party was the first to invent the claimed invention. A third party that files a patent application in the USPTO after March 2013, but before us, could therefore be awarded a patent covering an invention of ours even if we had made the invention before it was made by such third party. This will require us to be cognizant going forward of the time from invention to filing of a patent application. Since patent applications in the United States and most other countries are confidential for a period of time after filing or until issuance, we cannot be certain that we or our licensors were the first to either (i) file any patent application related to our product candidates, RED PLATFORM or other technologies or (ii) invent any of the inventions claimed in our or our licensor's patents or patent applications.

The America Invents Act also includes a number of significant changes that affect the way patent applications will be prosecuted and also may affect patent litigation. These include allowing third-party submission of prior art to the USPTO during patent prosecution and additional procedures to attack the validity of a patent by USPTO administered post-grant proceedings, including post-grant review, *inter partes* review, and derivation proceedings. Because of a lower evidentiary standard in USPTO proceedings compared to the evidentiary standard in United States federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third party may attempt to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action. Therefore, the America Invents Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our owned or in-licensed patent applications and the enforcement or defense of our owned or in-licensed issued patents, all of which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

In addition, the patent positions of companies in the development and commercialization of biologics and pharmaceuticals are particularly uncertain. Recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. This combination of events has created uncertainty with respect to the validity and enforceability of patents, once obtained. Depending on future actions by the U.S. Congress, the federal courts, and the USPTO, the laws and regulations governing patents could change in unpredictable ways that could have a material adverse effect on our existing patent portfolio and our ability to protect and enforce our intellectual property in the future.

Issued patents covering our product candidates, and any patents that may issue covering our RED PLATFORM technologies and other technologies, could be found invalid or unenforceable if challenged in court or before administrative bodies in the United States or abroad.

If we or one of our licensors initiated legal proceedings against a third party to enforce a patent covering our product candidates, RED PLATFORM technologies or other technologies, the defendant could counterclaim that such patent is invalid or unenforceable. In patent litigation in the United States, defendant counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the USPTO, or made a misleading statement, during prosecution. Third parties may raise claims challenging the validity or enforceability of our owned or in-licensed patents before administrative bodies in the United States or abroad, even outside the context of litigation. Such mechanisms include re-examination, post-grant review, *inter partes* review, interference proceedings, derivation proceedings, and equivalent proceedings in foreign jurisdictions (e.g., opposition proceedings). Such proceedings could result in the revocation of, cancellation of, or amendment to our patents in such a way that they no longer cover our product candidates, RED PLATFORM technologies, or other technologies. The outcome following legal assertions of invalidity and unenforceability is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art, of which we or our licensing partners and the patent examiner were unaware during prosecution. If a third party were to prevail on a legal assertion of invalidity or unenforceability, we would lose at least part, and perhaps all, of the patent protection on our product candidates, RED PLATFORM or other technologies. Such a loss of patent protection would have a material adverse impact on our business, financial condition, results of operations, and prospects.

If we do not obtain patent term extension and/or data exclusivity for any product candidates we may develop, our business may be materially harmed.

Depending upon the timing, duration and specifics of any FDA marketing approval of any product candidates we may develop, one or more of our owned or in-licensed U.S. patents may be eligible for limited patent term extension under the Hatch-Waxman Act. The Hatch-Waxman Act permits a patent term extension of up to five years as compensation for patent term lost during the FDA regulatory review process. A patent term extension cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval, only one patent may be extended and only those claims covering the approved drug, a method for using it, or a method for manufacturing it may be extended. Similar extensions as compensation for patent term lost during regulatory review processes are also available in certain foreign countries and territories, such as in Europe under a Supplementary Protection Certificate. However, we may not be granted an extension in the United States and/or foreign countries and territories because of, for example, failing to exercise due diligence during the testing phase or regulatory review process, failing to apply within applicable deadlines, failing to apply prior to expiration of relevant patents, or otherwise failing to satisfy applicable requirements. Moreover, the applicable time period or the scope of patent protection afforded could be less than we request. If we are unable to obtain patent term extension or the term of any such extension is shorter than what we request, our competitors may obtain approval of competing products following our patent expiration, and our business, financial condition, results of operations and prospects could be materially harmed.

We may be subject to claims challenging the inventorship of our patents and other intellectual property.

We or our licensors may be subject to claims that former employees, collaborators or other third parties have an interest in our owned or in-licensed patent rights, trade secrets, or other intellectual property as an inventor or co-inventor. For example, we or our licensors may have inventorship disputes arise from conflicting obligations of employees, consultants or others who are involved in developing our product candidates, RED PLATFORM or other technologies. Litigation may be necessary to defend against these and other claims challenging inventorship or our licensors' ownership of our owned or in-licensed patent rights, trade secrets or other intellectual property. If we or our licensors fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, intellectual property that is important to our product candidates, RED PLATFORM and other technologies. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations and prospects.

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

In addition to seeking patents for our product candidates, RED PLATFORM and other technologies, we also rely on trade secrets and confidentiality agreements to protect our unpatented know-how, technology, and other proprietary information and to maintain our competitive position. Trade secrets and know-how can be difficult to protect. We expect our trade secrets and know-how to over time be disseminated within the industry through independent development, the publication of journal articles describing the methodology, and the movement of personnel from academic to industry scientific positions.

We currently, and may continue in the future continue to, rely on third parties to assist us in developing and manufacturing our product candidates. Accordingly, we must, at times, share know-how and trade secrets, including those related to our RED PLATFORM, with them. We may in the future also enter into research and development collaborations with third parties that may require us to share know-how and trade secrets under the terms of our research and development partnerships or similar agreements. We seek to protect our know-how, trade secrets and other proprietary technology, in part, by entering into non-disclosure and confidentiality agreements, and including in our vendor and service agreements terms protecting our confidential information, know-how and trade secrets, with parties who have access to such information, such as our employees, scientific collaborators, contract research organizations, contract manufacturers, consultants, advisors and other third parties. We also enter into confidentiality and invention or patent assignment agreements with our employees and consultants, as well as train our employees not to bring or use proprietary information or technology from former employers to us or in their work, and we remind former employees when they leave their employment of their confidentiality obligations. However, we cannot guarantee that we have entered into such agreements with each party that may have or have had access to our trade secrets or proprietary technology and processes. We also seek to preserve the integrity and confidentiality of our data and other confidential information by maintaining physical security of our premises and physical and electronic security of our information technology systems.

Despite our efforts, any of the aforementioned parties may breach the agreements and disclose our proprietary information, including our trade secrets, or there may be a lapses or failures in our physical and electronic security systems which lead to our proprietary information being disclosed, and we may not be able to obtain adequate remedies in the event of any such breaches. Monitoring unauthorized uses and disclosures is difficult, and we do not know whether the steps we have taken to protect our proprietary technologies will be effective. If any of our scientific advisors, employees, contractors and consultants who are parties to these agreements breaches or violates the terms of any of these agreements, we may not have adequate remedies for any such breach or violation, and we could lose our trade secrets as a result. Moreover, if confidential information that is licensed or disclosed to us by our partners, collaborators, or others is inadvertently disclosed or subject to a breach or violation, we may be exposed to liability to the owner of that confidential information. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive, and time-consuming, and the outcome is unpredictable. In addition, some courts inside and outside the United States are less willing or unwilling to protect trade secrets. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor or other third party, we would have no right to prevent

them from using that technology or information to compete with us. If any of our trade secrets were to be disclosed to or independently developed by a competitor or other third party, our competitive position would be materially and adversely harmed.

We may not be successful in obtaining, through acquisitions, in-licenses or otherwise, necessary rights to our product candidates, RED PLATFORM technologies or other technologies.

We currently have rights to certain intellectual property, through licenses from third parties, to develop our product candidates and RED PLATFORM technologies. Some pharmaceutical companies, biotechnology companies, and academic institutions are competing with us in the field of cellular therapeutics and red blood cell technologies and may have patents and have filed and are likely filing patent applications potentially relevant to our business. In order to avoid infringing these third-party patents, we may find it necessary or prudent to obtain licenses to such patents from such third-party intellectual property holders. We may also require licenses from third parties for certain technologies that we are evaluating for use with our current or future product candidates. However, we may be unable to secure such licenses or otherwise acquire or in-license any compositions, methods of use, processes, or other intellectual property rights from third parties that we identify as necessary for our current or future product candidates and our RED PLATFORM at a reasonable cost or on reasonable terms, if at all. The licensing or acquisition of third-party intellectual property rights is a competitive area, and several more established companies may pursue strategies to license or acquire third-party intellectual property rights that we may consider attractive or necessary. These established companies may have a competitive advantage over us due to their size, capital resources and greater clinical development and commercialization capabilities. In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. We also may be unable to license or acquire third-party intellectual property rights on terms that would allow us to make an appropriate return on our investment or at all.

If we are unable to successfully obtain rights to required third-party intellectual property rights or maintain the existing intellectual property rights we have, we may be required to expend significant time and resources to redesign our technology, product candidates, or the methods for manufacturing them or to develop or license replacement technology, all of which may not be feasible on a technical or commercial basis. If we are unable to do so, we may be unable to develop or commercialize the affected product candidates or continue to utilize our existing RED PLATFORM technology, which could harm our business, financial condition, results of operations, and prospects significantly.

We may be subject to claims that our employees, consultants, or advisors have wrongfully used or disclosed alleged trade secrets of their current or former employers or claims asserting ownership of what we regard as our own intellectual property.

Many of our employees, consultants, and advisors are currently or were previously employed at universities or other biotechnology or pharmaceutical companies, including our licensors, competitors and potential competitors. Although we try to ensure that our employees, consultants, and advisors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or these individuals have used or disclosed intellectual property, including trade secrets or other proprietary information, of any such individual’s current or former employer. Litigation may be necessary to defend against these claims. If we fail in 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 defending against such claims, litigation could result in substantial costs and be a distraction to management.

In addition, while it is our policy to require our employees and contractors who may be involved in the conception or 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, conceives or develops intellectual property that we regard as our own. The assignment of intellectual property rights may not be self-executing, or the assignment agreements may be breached, and we may be forced to bring claims against third parties, or defend claims that they may bring against us, to determine the ownership of what we regard as our intellectual property. Such claims could have a material adverse effect on our business, financial condition, results of operations, and prospects.

Third-party claims of intellectual property infringement, misappropriation or other violation against us, our licensors or our collaborators may prevent or delay the development and commercialization of our product candidates, RED PLATFORM and other technologies.

The field of cellular therapeutics is competitive and dynamic. Due to the focused research and development that is taking place by several companies, including us and our competitors, in this field, the intellectual property landscape is in flux, and it may remain uncertain in the future. As such, there may be significant intellectual property related litigation and proceedings relating to our owned and in-licensed, and other third-party, intellectual property and proprietary rights in the future.

Our commercial success depends in part on our, our licensors' and our collaborators' ability to avoid infringing, misappropriating and otherwise violating the patents and other intellectual property rights of third parties. There is a substantial amount of complex 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 USPTO or oppositions and other comparable proceedings in foreign jurisdictions. As discussed above, 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. As stated above, this reform adds uncertainty to the possibility of challenge to our patents in the future.

Numerous U.S. and foreign issued patents and pending patent applications owned by third parties exist relating to red blood cell technologies and therapeutic proteins, and in the fields in which we are developing our product candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates, RED PLATFORM technologies and other technologies may give rise to claims of infringement of the patent rights of others. We cannot assure you that our product candidates, RED PLATFORM technologies and other technologies that we have developed, are developing or may develop in the future will not infringe existing or future patents owned by third parties. We may not be aware of patents that have already been issued and that a third party, for example, a competitor in the fields in which we are developing our product candidates, RED PLATFORM and other technologies might assert are infringed by our current or future product candidates, RED PLATFORM or other technologies, including claims to compositions, formulations, methods of manufacture or methods of use or treatment that cover our product candidates, RED PLATFORM or other technologies.

It is also possible that patents owned by third parties of which we are aware, but which we do not believe are relevant to our product candidates, RED PLATFORM or other technologies, could be found to be infringed by our product candidates, RED PLATFORM or other technologies. In addition, because patent applications can take many years to issue, there may be currently pending patent applications that may later result in issued patents that our product candidates, RED PLATFORM or other technologies may infringe. We cannot provide any assurances that third-party patents do not exist which might be enforced against our current technology, including our RED PLATFORM technologies, manufacturing methods, product candidates, or future methods or products resulting in either an injunction prohibiting our manufacture or future sales, or, with respect to our future sales, an obligation on our part to pay royalties and/or other forms of compensation to third parties, which could be significant.

Third parties may have patents or obtain patents in the future and claim that the manufacture, use or sale of our product candidates, RED PLATFORM or other technologies infringes upon these patents. We are aware of an issued patent outside the United States that is directed to erythrocytes that comprise exogeneous polypeptides. While we believe that we have reasonable defenses against a claim of infringement, including that certain claims in this patent are invalid, there can be no assurance that we will prevail in any such action by the holder of the patent. In the event that any third party claims that we infringe their patents or that we are otherwise employing their proprietary technology without authorization and initiates litigation against us, even if we believe such claims are without merit, a court of competent jurisdiction could hold that such patents are valid, enforceable and infringed by our product candidates, RED PLATFORM or other technologies. In this case, the holders of such patents may be able to block our ability to commercialize the applicable product candidate or technology unless we obtain a license under the applicable patents, or until such patents expire or are finally determined to be held invalid or unenforceable. Such a license may not be available on commercially reasonable terms or at all. Even if we are able to obtain a license, the license would likely obligate us to pay license fees or royalties or both, and the rights granted to us might be non-exclusive, which could

result in our competitors gaining access to the same intellectual property. If we are unable to obtain a necessary license to a third-party patent on commercially reasonable terms, we may be unable to commercialize our product candidates, RED PLATFORM, or other technologies, or such commercialization efforts may be significantly delayed, which could in turn significantly harm our business.

Defense of infringement claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of management and other employee resources from our business, and may impact our reputation. In the event of a successful claim of infringement against us, we may be enjoined from further developing or commercializing our infringing product candidates, RED PLATFORM, or other technologies. In addition, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, obtain one or more licenses from third parties, pay royalties and/or redesign our infringing product candidates or technologies, which may be impossible or require substantial time and monetary expenditure. In that event, we would be unable to further develop and commercialize our product candidates, RED PLATFORM, or other technologies, which could harm our business significantly.

Engaging in litigation to defend against third parties alleging that we have infringed, misappropriated or otherwise violated their patents or other intellectual property rights is very expensive, particularly for a company of our size, and time-consuming. Some of our competitors may be able to sustain the costs of litigation or administrative proceedings more effectively than we can because of greater financial resources. Patent litigation and other proceedings may also absorb significant management time. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings against us could impair our ability to compete in the marketplace. The occurrence of any of the foregoing could have a material adverse effect on our business, financial condition or results of operations.

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

Our registered or unregistered trademarks or trade names may be challenged, infringed, circumvented or declared generic or determined to be infringing on other marks. We may not be able to protect our rights to these trademarks and trade names, which we need to build name recognition among potential partners or customers in our markets of interest. At times, competitors or other third parties may adopt trade names or trademarks similar to ours, thereby impeding our ability to build brand identity and possibly leading to market confusion. If we assert trademark infringement claims, a court may determine that the marks we have asserted are invalid or unenforceable, or that the party against whom we have asserted trademark infringement has superior rights to the marks in question. In this case, we could ultimately be forced to cease use of such trademarks. In addition, there could be potential trade name or trademark infringement claims brought by owners of other registered trademarks or trademarks that incorporate variations of our registered or unregistered trademarks or trade names. Over the long term, if we are unable to establish name recognition based on our trademarks and trade names, then we may not be able to compete effectively and our business may be adversely affected. Our efforts to enforce or protect our proprietary rights related to trademarks, trade secrets, domain names, copyrights or other intellectual property may be ineffective and could result in substantial costs and diversion of resources and could adversely affect our business, financial condition, results of operations and prospects.

Intellectual property rights do not necessarily address all potential threats.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations and may not adequately protect our business or permit us to maintain our competitive advantage. For example:

- others may be able to make products that are similar to our product candidates or utilize similar technology but that are not covered by the claims of the patents that we license or own;

- we, or our current or future licensors or collaborators, might not have been the first to make the inventions covered by the issued patent or pending patent application that we license or own now or in the future;

- we, or our current or future licensors or collaborators, might not have been the first to file patent applications covering certain of our or their inventions;
- others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our owned or licensed intellectual property rights;
- it is possible that our current or future pending owned or licensed patent applications will not lead to issued patents;
- issued patents that we hold rights to may be held invalid or unenforceable, including as a result of legal challenges by our competitors or other third parties;
- our competitors or other third parties might conduct research and development activities in countries where we do not have patent rights and then use the information learned from such activities to develop competitive products for sale in our major commercial markets;
- we may not develop additional proprietary technologies that are patentable;
- the patents of others may harm our business; and
- we may choose not to file a patent in order to maintain certain trade secrets or know-how, and a third party may subsequently file a patent covering such intellectual property.

Should any of these events occur, they could have a material adverse effect on our business, financial condition, results of operations and prospects.

Risks related to our reliance on third parties

We rely on third parties to conduct our clinical trials. If these third parties do not successfully carry out their contractual duties or meet expected deadlines or comply with regulatory requirements, we may not be able to obtain regulatory approval of, or commercialize, any potential product candidates.

We will depend upon third parties, including independent investigators, to conduct our clinical trials under agreements with universities, medical institutions, CROs, strategic partners and others. We have had to, and expect to continue to have to, negotiate budgets and contracts with CROs and trial sites, which may result in delays to our development timelines and increased costs.

We will rely heavily on third parties over the course of our clinical trials, and, as a result, will have limited control over the clinical investigators and limited visibility into their day-to-day activities, including with respect to their compliance with the approved clinical protocol. Nevertheless, we are responsible for ensuring that each of our trials is conducted in accordance with the applicable protocol, legal and regulatory requirements and scientific standards, and our reliance on third parties does not relieve us of our regulatory responsibilities. We and these third parties are required to comply with GCP requirements, which are regulations and guidelines enforced by the FDA and comparable foreign regulatory authorities for product candidates in clinical development. Regulatory authorities enforce these GCP requirements through periodic inspections of trial sponsors, clinical investigators and trial sites. If we or any of these third parties fail to comply with applicable GCP requirements, the clinical data generated in our clinical trials may be deemed unreliable and the FDA or comparable foreign regulatory authorities may require us to suspend or terminate these trials or perform additional nonclinical studies or clinical trials before approving our marketing applications. We cannot be certain that, upon inspection, such regulatory authorities will determine that any of our clinical trials comply with the GCP requirements. In addition, our clinical trials must be conducted with biologic product produced under cGMP requirements and may require a large number of patients.

Our failure or any failure by these third parties to comply with these regulations or to recruit a sufficient number of patients may require us to repeat clinical trials, which would delay the regulatory approval process. Moreover, our

business may be implicated if any of these third parties violates federal or state fraud and abuse or false claims laws and regulations or healthcare privacy and security laws.

Any third parties conducting our future clinical trials will not be our employees and, except for remedies that may be available to us under our agreements with such third parties, we cannot control whether or not they devote sufficient time and resources to our ongoing nonclinical and clinical programs. These third parties may also have relationships with other commercial entities, including our competitors, for whom they may also be conducting clinical trials or other product development activities, which could affect their performance on our behalf. If these third parties do not successfully carry out their contractual duties or obligations or meet expected deadlines, if they need to be replaced or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements or for other reasons, our clinical trials may be extended, delayed or terminated and we may not be able to complete development of, obtain regulatory approval of or successfully commercialize our product candidates. As a result, our financial results and the commercial prospects for our product candidates would be harmed, our costs could increase and our ability to generate revenue could be delayed.

If any of our relationships with these third-party CROs or others terminate, we may not be able to enter into arrangements with alternative CROs or other third parties or to do so on commercially reasonable terms. Switching or adding additional CROs involves additional cost and requires management time and focus. In addition, there is a natural transition period when a new CRO begins work. As a result, delays may occur, which can materially impact our ability to meet our desired clinical development timelines. Though we carefully manage our relationships with our CROs, there can be no assurance that we will not encounter similar challenges or delays in the future or that these delays or challenges will not have a material adverse impact on our business, financial condition and prospects.

We may rely on third parties to conduct investigator-sponsored clinical trials of our product candidates. Any failure by a third party to meet its obligations with respect to the clinical development of our product candidates may delay or impair our ability to obtain regulatory approval for other product candidates.

We may rely on academic and private non-academic institutions to conduct and sponsor clinical trials relating to our product candidates. We will not control the design or conduct of the investigator-sponsored trials, and it is possible that the FDA or non-U.S. regulatory authorities will not view these investigator-sponsored trials as providing adequate support for future clinical trials, whether controlled by us or third parties, for any one or more reasons, including elements of the design or execution of the trials or safety concerns or other trial results.

Such arrangements will likely provide us certain information rights with respect to the investigator-sponsored trials, including access to and the ability to use and reference the data, including for our own regulatory filings, resulting from the investigator-sponsored trials. However, we would not have control over the timing and reporting of the data from investigator-sponsored trials, nor would we own the data from the investigator-sponsored trials. If we are unable to confirm or replicate the results from the investigator-sponsored trials or if negative results are obtained, we would likely be further delayed or prevented from advancing further clinical development of our product candidates. Further, if investigators or institutions breach their obligations with respect to the clinical development of our product candidates, or if the data proves to be inadequate compared to the first-hand knowledge we might have gained had the investigator-sponsored trials been sponsored and conducted by us, then our ability to design and conduct any future clinical trials ourselves may be adversely affected.

Additionally, the FDA or non-U.S. regulatory authorities may disagree with the sufficiency of our right of reference to the preclinical, manufacturing or clinical data generated by these investigator-sponsored trials, or our interpretation of preclinical, manufacturing or clinical data from these investigator-sponsored trials. If so, the FDA or other non-U.S. regulatory authorities may require us to obtain and submit additional preclinical, manufacturing, or clinical data before we may initiate our planned trials and/or may not accept such additional data as adequate to initiate our planned trials.

We may rely on third parties to produce and process our products, if approved.

We currently rely on outside vendors to supply raw materials and other important components, such as CD34+ precursor cells and lentiviral vectors, that are used to manufacture our product candidates. We have only recently begun clinical

scale manufacturing and have not reached commercial scale manufacturing capabilities. We may not be able to manufacture sufficient materials to meet clinical demand for all of our product candidates and may not reach commercial scale for any of our product candidates. We will make changes as we work to optimize the manufacturing process for our product candidates, and we cannot be sure that even minor changes in the process will result in therapies that are safe and effective.

The facilities used to manufacture our product candidates must be approved by the FDA or other foreign regulatory agencies pursuant to inspections that will be conducted after we submit an application to the FDA or other foreign regulatory agencies. As of January 2020, our manufacturing facility purchased in 2018 is operational and we are and will continue to be responsible for compliance with regulatory requirements, known as cGMP requirements, and the clinical supply of our product candidates is also subject to compliance with cGMP requirements. If we or any contract manufacturers that we may engage cannot successfully manufacture in conformance with our specifications and the strict regulatory requirements of the FDA or other regulatory authorities, we and they will not be able to secure and/or maintain regulatory approval for their manufacturing facilities with respect to the manufacture of our product candidates. In addition, we have no control over the ability of any contract manufacturers that we may engage to maintain adequate quality control, quality assurance and qualified personnel. If the FDA or a comparable foreign regulatory authority does not approve these facilities for the manufacture of our product candidates or if it withdraws any such approval in the future, we may need to find alternative manufacturing facilities, which would significantly impact our ability to develop, obtain regulatory approval for or market our product candidates, if approved.

For more information, see “Risk factors—Risks related to manufacturing and supply” below.

Cell therapies rely on the availability of specialty raw materials, which may not be available to us on acceptable terms or at all.

Our product candidates require certain specialty raw materials, some of which we obtain from small companies with limited resources and experience to support a commercial product. In addition, those suppliers normally support blood-based hospital businesses and generally do not have the capacity to support commercial products manufactured under cGMP by biopharmaceutical firms. The suppliers may be ill-equipped to support our needs, especially in non-routine circumstances like an FDA inspection or medical crisis, such as widespread contamination. We do not currently have contracts in place with all of the suppliers that we may need at any point in time, and if needed, may not be able to contract with them on acceptable terms or at all. Accordingly, we may experience delays in receiving key raw materials to support clinical or commercial manufacturing.

We are dependent on suppliers for some of our components, precursor cells and materials used to manufacture our product candidates.

We currently depend on suppliers for some of the components and precursor cells necessary for our product candidates and our suppliers of precursor cells depend on the availability of human donors. We cannot be sure that these suppliers will remain in business, that they will be able to identify and recruit adequate numbers of donors, that they will be able to meet our supply needs, or that they will not be purchased by one of our competitors or another company that is not interested in continuing to produce these materials for our intended purpose. Additionally, we rely on sole suppliers for certain of our supplies. If these sole suppliers are unable to supply to us in the quantities we require, or at all, or otherwise default on their supply obligations to us, we may not be able to obtain alternative supplies from other suppliers on acceptable terms, in a timely manner, or at all.

There are, in general, relatively few alternative sources of supply for these components and precursor cells. These suppliers may be unable or unwilling to meet our future demands for our clinical trials or commercial sale. Establishing additional or replacement suppliers for these components and precursor cells could take a substantial amount of time and it may be difficult to establish replacement suppliers who meet regulatory requirements. Any disruption in supply from a supplier or manufacturing location could lead to supply delays or interruptions which would damage our business, financial condition, results of operations and prospects.

If we are able to find a replacement supplier, the replacement supplier would need to be qualified and may require additional regulatory authority approval, which could result in further delay. While we seek to maintain adequate inventory of the components, precursor cells and other materials used to manufacture our products, any interruption or delay in the supply of components, precursor cells or other materials, or our inability to obtain components, precursor cells or materials from alternate sources at acceptable prices in a timely manner, could impair our ability to meet clinical and commercial demand.

In addition, as part of the FDA's approval of our product candidates, we will also require FDA approval of the individual components of our process, which include the manufacturing processes and facilities of our suppliers.

Our reliance on these suppliers subjects us to a number of risks that could harm our business, and financial condition, including, among other things:

- material interruption of product candidate or commercial supply resulting from modifications to or discontinuation of a supplier's operations as a result of the COVID-19 pandemic;
- the continued manufacture and supply of raw materials and components for the Company's clinical and development programs, which, in some cases, have been delayed or interrupted due to the COVID-19 pandemic, and the availability of any of which could be significantly impaired in the future by the COVID-19 pandemic;
- delays in product shipments resulting from uncorrected defects, reliability issues, or a supplier's variation in a component;
- a lack of long-term supply arrangements for key components with our suppliers;
- inability to obtain adequate supply in a timely manner, or to obtain adequate supply on commercially reasonable terms;
- difficulty and cost associated with locating and qualifying alternative suppliers for our components and precursor cells in a timely manner;
- production delays related to the evaluation and testing of products from alternative suppliers, and corresponding regulatory qualifications;
- continued delay in delivery due to our suppliers prioritizing other customer orders over ours, in particular to meet demand for vaccines, or other delays related to the COVID-19 pandemic; and
- fluctuation in delivery by our suppliers due to changes in demand from us or their other customers.

If any of these risks materialize, our manufacturing costs could significantly increase and our ability to meet clinical and commercial demand for our products could be impacted.

Our future collaborations may be important to our business. If we are unable to maintain any of these collaborations, or if these collaborations are not successful, our business could be adversely affected.

We have limited capabilities for product development and do not yet have any capability for sales, marketing or distribution. Accordingly, we may enter into collaborations with other companies to provide us with important technologies and funding for our programs and technology, and we may receive additional technologies and funding under these and other collaborations in the future. Any future collaborations we enter into, may pose a number of risks, including the following:

- collaborators have significant discretion in determining the efforts and resources that they will apply;
- collaborators may not perform their obligations as expected;

- collaborators may not pursue development and commercialization of any product candidates that achieve regulatory approval or may elect not to continue or renew development or commercialization programs or license arrangements based on clinical trial results, changes in the collaborators' strategic focus or available funding, or external factors, such as a strategic transaction that may divert resources or create competing priorities;

- collaborators may delay clinical trials, provide insufficient funding for a clinical trial program, stop a clinical trial or abandon a product candidate, repeat or conduct new clinical trials or require a new formulation of a product candidate for clinical testing;

- collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our products and product candidates if the collaborators believe that the competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive than ours;

- product candidates discovered in collaboration with us may be viewed by our collaborators as competitive with their own product candidates or products, which may cause collaborators to cease to devote resources to the commercialization of our product candidates;

- collaborators may fail to comply with applicable regulatory requirements regarding the development, manufacture, distribution or marketing of a product candidate or product;

- collaborators with marketing and distribution rights to one or more of our product candidates that achieve regulatory approval may not commit sufficient resources to the marketing and distribution of such product or products;

- disagreements with collaborators, including disagreements over proprietary rights, contract interpretation or the preferred course of development, might cause delays or terminations of the research, development or commercialization of product candidates, might lead to additional responsibilities for us with respect to product candidates, or might result in litigation or arbitration, any of which would be time-consuming and expensive;

- collaborators may not properly maintain or defend our intellectual property rights or may use our proprietary information in such a way as to invite litigation that could jeopardize or invalidate our intellectual property or proprietary information or expose us to potential litigation;

- collaborators may infringe the intellectual property rights of third parties, which may expose us to litigation and potential liability;

- if a collaborator of ours is involved in a business combination, the collaborator might deemphasize or terminate the development or commercialization of any product candidate licensed to it by us; and

- collaborations may be terminated by the collaborator, and, if terminated, we could be required to raise additional capital to pursue further development or commercialization of the applicable product candidates.

If our potential future collaborations do not result in the successful discovery, development and commercialization of products or if one of our future collaborators terminates its agreement with us, we may not receive any future research funding or milestone or royalty payments under the collaboration. If we do not receive the funding we expect under these agreements, our development of our technology and product candidates could be delayed and we may need additional resources to develop product candidates and our technology. All of the risks relating to product development, regulatory approval and commercialization described in this Quarterly Report on Form 10-Q also apply to the activities of our future therapeutic collaborators.

Additionally, if one of our potential future collaborators terminates its agreement with us, we may find it more difficult to attract new collaborators and our perception in the business and financial communities could be adversely affected.

Collaborations are complex and time-consuming to negotiate and document. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators. We face significant competition in seeking appropriate collaborators. Our ability to reach a definitive agreement for a collaboration will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and the proposed collaborator's evaluation of a number of factors. If we are unable to reach agreements with suitable collaborators on a timely basis, on acceptable terms, or at all, we may have to curtail the development of a product candidate, reduce or delay its development program or one or more of our other development programs, delay its potential commercialization or reduce the scope of any sales or marketing activities, or increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional expertise and additional capital, which may not be available to us on acceptable terms, or at all. If we fail to enter into collaborations or do not have sufficient funds or expertise to undertake the necessary development and commercialization activities, we may not be able to further develop our product candidates, bring them to market and generate revenue from sales of drugs or continue to develop our technology, and our business may be materially and adversely affected.

Risks related to manufacturing and supply

Our product candidates are uniquely manufactured. If we or any third-party manufacturers that we may engage encounter difficulties in manufacturing our product candidates or any of their components, our ability to provide supply of our product candidates for clinical trials or our products for patients, if approved, could be delayed or stopped, or we may be unable to maintain a commercially viable cost structure.

The manufacturing process used to produce our product candidates is complex and novel and it has not previously been used to manufacture products for clinical testing or commercialization. As a result of these complexities, the cost to manufacture our product candidates is higher than traditional small molecule chemical compounds and monoclonal antibodies and the manufacturing process is less reliable and is more difficult to reproduce. Furthermore, our manufacturing process development and scale-up is at an early stage. The actual cost to manufacture and process our product candidates could be greater than we expect and could materially and adversely affect the commercial viability of our product candidates.

Our manufacturing process may be susceptible to logistical issues associated with the collection of hematopoietic precursor cells from donors, procurement of plasmids and lentiviral vectors sourced from various suppliers and shipment to the RCT product candidate manufacturing site, as well as shipment of the final product to clinical centers, manufacturing issues associated with interruptions in the manufacturing process, contamination, equipment or reagent failure, improper installation or operation of equipment, vendor or operator error, inconsistency in cell growth, and variability in product characteristics. Even minor deviations from normal manufacturing processes, or changes to these processes, could result in reduced production yields, lot failures, product defects, product recalls, product liability claims and other supply disruptions. If microbial, viral, or other contaminations are discovered in our product candidates or in our manufacturing facilities in which our product candidates are made, production at such manufacturing facilities may be interrupted for an extended period of time to investigate and remedy the contamination. Further, as product candidates are developed through preclinical to late-stage clinical trials toward approval and commercialization, it is common that various aspects of the development program, such as manufacturing methods, are altered along the way in an effort to optimize processes and results. Such changes can trigger regulatory review or delays and, regardless of regulatory feedback, will carry the risk that they will not achieve these intended objectives, and any of these changes could cause our product candidates to perform differently and affect the results of ongoing clinical trials or other future clinical trials.

Although we continue to optimize our manufacturing process for our RCT product candidates, doing so is a difficult and uncertain task, and there are risks associated with scaling to the level required for advanced clinical trials or commercialization, including, among others, cost overruns, potential problems with process scale-up, process reproducibility, stability issues, lot consistency, and timely availability of reagents and/or raw materials. We ultimately may not be successful in operating the manufacturing facility we established ourselves, or any contract manufacturer that we may engage with may not have the necessary capabilities to successfully implement our manufacturing process. If we are unable to adequately validate or scale-up the manufacturing process for our product candidates as planned, we will

need to transfer to an alternative contract manufacturer and complete the manufacturing validation process, which can be costly, lengthy and unpredictable. If we are able to adequately validate and scale-up the manufacturing process for our product candidates with a contract manufacturer that we may engage, we may still need to negotiate with such contract manufacturer an agreement for commercial supply and it is not certain we will be able to come to agreement on terms acceptable to us. As a result, we may ultimately be unable to reduce the cost of goods for our product candidates to levels that will allow for an attractive return on investment if and when those product candidates are commercialized.

The manufacturing process for any products that we may develop is subject to the FDA and foreign regulatory authority approval process, and we will need to contract with manufacturers who can meet all applicable FDA and foreign regulatory authority requirements on an ongoing basis. If we or our CMOs that we may engage are unable to reliably produce products to specifications acceptable to the FDA or other regulatory authorities, we may not obtain or maintain the approvals we need to commercialize such products. Even if we obtain regulatory approval for any of our product candidates, there is no assurance that either we or our CMOs that we may engage will be able to manufacture the approved product to specifications acceptable to the FDA or other regulatory authorities, to produce it in sufficient quantities to meet the requirements for the potential launch of the product, or to meet potential future demand. Any of these challenges could delay completion of clinical trials, require bridging clinical trials or the repetition of one or more clinical trials, increase clinical trial costs, delay approval of our product candidates, impair commercialization efforts, increase our cost of goods, and have an adverse effect on our business, financial condition, results of operations and growth prospects. We or CMOs we may engage may fail to manage the logistics of storing and shipping our raw materials and product candidates. Storage failures and shipment delays and problems caused by us, our vendors or other factors not in our control, such as weather, could result in the inability to manufacture product, the loss of usable product or prevent or delay the delivery of product candidates to patients. Our future success depends on our ability to manufacture our products on a timely basis with acceptable manufacturing costs, while at the same time maintaining good quality control and complying with applicable regulatory requirements, and an inability to do so could have a material adverse effect on our business, financial condition, and results of operations. In addition, we could incur higher manufacturing costs if manufacturing processes or standards change, and we could need to replace, modify, design, or build and install equipment, all of which would require additional capital expenditures. Specifically, because our product candidates may have a higher cost of goods than conventional therapies, the risk that coverage and reimbursement rates may be inadequate for us to achieve profitability may be greater.

If any CMO with whom we contract fails to perform its obligations, we may be forced to enter into an agreement with a different CMO, which we may not be able to do on reasonable terms, if at all. Our clinical trials supply could be delayed significantly as a result. In some cases, the technical skills required to manufacture our products or product candidates may be unique or proprietary to the original CMO and we may have difficulty, or there may be contractual restrictions prohibiting us from, transferring such skills to a back-up or alternate supplier, or we may be unable to transfer such skills at all. In addition, if we are required to change CMOs for any reason, we will be required to verify that the new CMO maintains facilities and procedures that comply with quality standards and with all applicable regulations. We will also need to verify, such as through a manufacturing comparability study, that any new manufacturing process will produce our product candidate according to the specifications previously submitted to the FDA or another regulatory authority. The delays associated with the verification of a new CMO could negatively affect our ability to develop product candidates or commercialize our products in a timely manner or within budget. Furthermore, a CMO may possess technology related to the manufacture of our product candidate that such CMO owns independently. This would increase our reliance on such CMO or require us to obtain a license from such CMO in order to have another CMO manufacture our product candidates. In addition, changes in manufacturers often involve changes in manufacturing procedures and processes, which could require that we conduct bridging studies between our prior clinical supply used in our clinical trials and that of any new manufacturer. We may be unsuccessful in demonstrating the comparability of clinical supplies which could require the conduct of additional clinical trials.

We have acquired and are establishing our own manufacturing facility and infrastructure in addition to or in lieu of relying on CMOs for the manufacture of our product candidates, which is costly, time-consuming, and which may not be successful.

In July 2018, we purchased a 135,000 square foot manufacturing facility located in Smithfield, Rhode Island as an alternative or in addition to our reliance on CMOs for the manufacture of our product candidates. As of January 2020,

this manufacturing facility is operational and is expected to provide cGMP materials for clinical supply and, ultimately, commercial product upon regulatory approval. We are currently providing cGMP supply for our ongoing RTX-240 and RTX-321 cancer clinical trials from this site.

We expect that our own manufacturing facility will provide us with enhanced control of material supply for both clinical trials and commercial product, enable more rapid implementation of process changes, and allow for better long-term cost of goods manufactured. However, we do not have extensive experience as a company in setting up, building, managing or operating a manufacturing facility and may never be successful in developing or operating this facility and recognizing its full capabilities. As a result, we may need to hire additional personnel to manage our operations and facilities and develop the necessary infrastructure to continue the research and development, and eventual commercialization, if approved, of our product candidates. Additionally, if we have failed to select the correct location for our facility, or if we fail to complete any future renovations in an efficient manner, or fail to generally manage our growth effectively, the development and production of our product candidates could be curtailed or delayed, or could require changes in the manufacturing process which could trigger the requirement to conduct bridging studies. We may establish multiple manufacturing facilities as we expand our commercial footprint to multiple geographies, which may lead to regulatory delays or prove costly. Even if we are successful, our manufacturing capabilities could be affected by cost-overruns, unexpected delays, equipment failures, labor shortages, natural disasters, utility failures and numerous other factors that could prevent us from realizing the intended benefits of our manufacturing strategy and have a material adverse effect on our business.

In addition, the FDA, the EMA and other foreign regulatory authorities may require us to submit samples of any lot of any approved product together with the protocols showing the results of applicable tests at any time. Under some circumstances, the FDA, the EMA or other foreign regulatory authorities may require that we not distribute a lot until the relevant agency authorizes its release. Slight deviations in the manufacturing process, including those affecting quality attributes and stability, may result in unacceptable changes in the product that could result in lot failures or product recalls. Lot failures or product recalls could cause us to delay product launches or clinical trials, which could be costly to us and otherwise harm our business, financial condition, results of operations and prospects. Problems in our manufacturing process could restrict our ability to meet market demand for our products.

We also may encounter problems hiring and retaining the experienced scientific, quality-control and manufacturing personnel needed to operate our manufacturing processes, which could result in delays in production or difficulties in maintaining compliance with applicable regulatory requirements.

Any problems in our manufacturing process or facilities could make us a less desirable collaborator for potential partners, including larger pharmaceutical companies and academic research institutions, which could limit our access to additional attractive development programs and capital.

We have limited experience as a company managing a manufacturing facility.

Operating our own manufacturing facility will require significant resources, and we have limited experience as a company in managing a manufacturing facility, having done so only since January 2020, when our Smithfield, RI facility became operational. In part because of this limited experience, we cannot be certain that our manufacturing plans will be completed on time, if at all, or if manufacturing of product candidates from our own manufacturing facility for our ongoing or future clinical trials will begin or be completed on time, if at all. In part because of our inexperience, we may have unacceptable or inconsistent product quality success rates and yields, and we may be unable to maintain adequate quality control, quality assurance and qualified personnel. Failure to successfully operate our manufacturing facility could adversely affect the approvability and commercial viability of our product candidates.

Risks related to our common stock

An active trading market for our common stock may not be sustained.

Our shares of common stock began trading on The Nasdaq Global Select Market on July 18, 2018. Given the limited trading history of our common stock, there is a risk that an active trading market for our shares will not be sustained, which could put downward pressure on the market price of our common stock and thereby affect the ability of our stockholders to sell their shares.

The price of our stock may be volatile, and our stockholders could lose all or part of their investment.

The trading price of our common stock is likely to be highly volatile and could be subject to wide fluctuations in response to various factors, some of which are beyond our control, including limited trading volume. Since our common stock began trading on The Nasdaq Global Select Market on July 18, 2018, our stock price has traded at prices as low as $3.35 per share and as high as $38.71 per share through July 30, 2021. In addition to the factors discussed in this "Risk factors" section and elsewhere in this Quarterly Report on Form 10-Q, these factors include:

- the commencement, enrollment or results of our ongoing and planned clinical trials of our product candidates or any future clinical trials we may conduct, or changes in the development status of our product candidates;
- any delay in our regulatory filings for our product candidates and any adverse development or perceived adverse development with respect to the applicable regulatory authority's review of such filings;
- adverse or uninterpretable results from or delays in clinical trials of our product candidates, such as those we encountered with our Phase 1b clinical trial for RTX-134 which we have since discontinued;
- our decision to initiate a clinical trial, not to initiate a clinical trial or to terminate an existing clinical trial;
- adverse regulatory decisions, including failure to receive regulatory approval of our product candidates;
- changes in laws or regulations applicable to our product candidates, including but not limited to clinical trial requirements for approvals;
- adverse developments concerning the manufacture of our product candidates, such as the difficulties encountered by our former contract manufacturer for clinical supply of our discontinued Phase 1b clinical trial for RTX-134;
- our inability to obtain adequate product supply for any approved product or inability to do so at acceptable prices;
- our inability to establish collaborations, if needed;
- our failure to commercialize our product candidates;
- additions or departures of key scientific or management personnel;
- unanticipated serious safety concerns related to the use of our product candidates;
- introduction of new products or services by our competitors;
- announcements of significant acquisitions, strategic partnerships, joint ventures or capital commitments by us or our competitors;
- our ability to effectively manage our growth;

- the size and growth of our initial target markets;
- actual or anticipated variations in quarterly operating results;
- our cash position;
- our failure to meet the estimates and projections of the investment community or that we may otherwise provide to the public;
- publication of research reports about us or our industry, or cellular therapies in particular, or positive or negative recommendations or withdrawal of research coverage by securities analysts;
- changes in the market valuations of similar companies;
- overall performance of the equity markets;
- sales of our common stock by us or our stockholders in the future;
- trading volume of our common stock;
- adoption of new accounting standards;
- ineffectiveness of our internal controls;
- disputes or other developments relating to proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our technologies;
- significant lawsuits, including patent or stockholder litigation;
- general political and economic conditions; and
- other events or factors, many of which are beyond our control, including pandemics such as COVID-19.

In addition, the stock market in general, and the market for biopharmaceutical companies in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of these companies. Broad market and industry factors may negatively affect the market price of our common stock, regardless of our actual operating performance. Additionally, technical factors in the public trading market for our stock may produce price movements that may or may not comport with macro, industry or company-specific fundamentals, including, without limitation, the sentiment of retail investors (including as may be expressed on financial trading and other social media sites), speculation in the press, in the investment community, or on the internet, including on online forums and social media, about us, our industry or our securities, the amount and status of short interest in our securities (including a “short squeeze”), access to margin debt, trading in options and other derivatives on our common stock and other technical trading factors. We may incur rapid and substantial decreases in our stock price in the foreseeable future that are unrelated to our operating performance or prospects. There can be no guarantee that our stock price will remain at current prices or that future sales of our common stock will not be at prices lower than the sales price in previous offerings. If the market price of our common stock does not exceed their purchase price, our stockholders may not realize any return on their investment in us and may lose some or all of their investment. In the past, securities class action litigation has often been instituted against companies following periods of volatility in the market price of a company’s securities. This type of litigation, if instituted, could result in substantial costs and a diversion of management’s attention and resources, which would harm our business, operating results or financial condition.

We do not intend to pay dividends on our common stock so any returns will be limited to the value of our stock.

We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. Any return to stockholders will therefore be limited in the foreseeable future to the appreciation of their stock.

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

Our executive officers, directors and their affiliates beneficially hold, in the aggregate, over 50% of our outstanding voting stock. These stockholders will have the ability to influence us through this ownership position. These stockholders may be able to determine all matters requiring stockholder approval. For example, these stockholders may be able to control elections of directors, amendments of our organizational documents, or approval of any merger, sale of assets, or other major corporate transaction. This may prevent or discourage unsolicited acquisition proposals or offers for our common stock that our stockholders may feel are in their best interest as one of our stockholders.

We are an emerging growth company, and we cannot be certain if the reduced reporting requirements applicable to emerging growth companies will make our common stock less attractive to investors.

We are an emerging growth company, as defined in the Jumpstart Our Business Startups Act, or the JOBS Act, enacted in April 2012. For as long as we continue to be an emerging growth company, we may take advantage of exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies, including not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended, or the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements and exemptions from the requirements of holding nonbinding advisory votes on executive compensation and stockholder approval of any golden parachute payments not previously approved. We could be an emerging growth company for up to five years following the year in which we completed our IPO, although circumstances could cause us to lose that status earlier. We will remain an emerging growth company until the earlier of (1) the last day of the fiscal year (a) following the fifth anniversary of the completion of our IPO; (b) in which we have total annual gross revenue of at least $1.07 billion; or (c) in which we are deemed to be a large accelerated filer, which requires the market value of our common stock that is held by non-affiliates to exceed $700.0 million as of the prior June 30th; and (2) the date on which we have issued more than $1.0 billion in non-convertible debt during the prior three-year period. We cannot predict if investors will find our common stock less attractive because we may rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile.

Under the JOBS Act, emerging growth companies can also delay adopting new or revised accounting standards until such time as those standards apply to private companies. We have elected not to “opt out” of such extended transition period, which means that when a standard is issued or revised and it has different application dates for public or private companies, we will adopt the new or revised standard at the time private companies adopt the new or revised standard and will do so until such time that we either (i) irrevocably elect to “opt out” of such extended transition period or (ii) no longer qualify as an emerging growth company. This may make comparison of our condensed consolidated financial statements with the financial statements of another public company that is not an emerging growth company, or an emerging growth company that has opted out of using the extended transition period, difficult or impossible because of the potential differences in accounting standards used.

As of June 30, 2021, the last business day of our most recently completed second fiscal quarter, the market value of our common stock held by non-affiliates was greater than $700 million. As a result, we will become a large accelerated filer and will no longer qualify as an emerging growth company on December 31, 2021, the end of our current fiscal year. Accordingly, at that time we will cease to be eligible for the emerging growth company provisions of the JOBS Act.

We incur significant increased costs as a result of operating as a public company, and our management is required to devote substantial time to new compliance initiatives.

As a public company, we incur significant legal, accounting and other expenses that we did not incur as a private company. We are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, which require, among other things, that we file with the SEC annual, quarterly and current reports with respect to our business and financial condition. In addition, the Sarbanes-Oxley Act, as well as rules subsequently adopted by the SEC and The Nasdaq Market to implement provisions of the Sarbanes-Oxley Act, impose significant requirements on public companies, including requiring establishment and maintenance of effective disclosure and financial controls and changes in corporate governance practices. Further, in July 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act, was enacted. There are significant corporate governance and executive compensation related provisions in the Dodd-Frank Act that require the SEC to adopt additional rules and regulations in these areas, such as "say on pay" and proxy access. Recent legislation permits emerging growth companies to implement many of these requirements over a longer period and up to five years from the pricing of our IPO. Although we believe we have adequately planned for transitioning to a large accelerated filer as of December 31, 2021, we may incur unexpected expenses or challenges in making such transition. Stockholder activism, the current political environment and the current high level of government intervention and regulatory reform may lead to substantial new regulations and disclosure obligations, which may lead to additional compliance costs and impact the manner in which we operate our business in ways we cannot currently anticipate.

The rules and regulations applicable to public companies substantially increase our legal and financial compliance costs and make some activities more time-consuming and costly. If these requirements divert the attention of our management and personnel from other business concerns, they could have a material adverse effect on our business, financial condition and results of operations. The increased costs will decrease our net income or increase our net loss and may require us to reduce costs in other areas of our business or increase the prices of our products or services. For example, we expect these rules and regulations to make it more difficult and more expensive for us to obtain director and officer liability insurance and we may be required to incur substantial costs to maintain the same or similar coverage. We cannot predict or estimate the amount or timing of additional costs we may incur to respond to these requirements. The impact of these requirements could also make it more difficult for us to attract and retain qualified persons to serve on our board of directors, our board committees or as executive officers.

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

In the event a public market for our common stock is sustained in the future, sales of our common stock may be made by holders of our public float or by holders of restricted securities in compliance with the provisions of Rule 144 of the Securities Act of 1933, or the Securities Act. In general, under Rule 144, a non-affiliated person who has satisfied a six-month holding period in a company registered under the Exchange Act, as amended, may sell their restricted common stock without volume limitation, so long as the issuer is current with all reports under the Exchange Act in order for there to be adequate common public information. Affiliated persons may also sell their common shares held for at least six months, but affiliated persons will be required to meet certain other requirements, including manner of sale, notice requirements and volume limitations. Non-affiliated persons who hold their common shares for at least one year will be able to sell their common stock without the need for there to be current public information in the hands of the public. Future sales of shares of our public float or by restricted common stock made in compliance with Rule 144 may have an adverse effect on the then prevailing market price, if any, of our common stock.

Shares of common stock that are either subject to outstanding options or reserved for future issuance under our existing equity compensation plans will become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules and Rule 144 and Rule 701 under the Securities Act. If these additional shares of common stock are sold, or if it is perceived that they will be sold, in the public market, the trading price of our common stock could decline. Additionally, the number of shares of our common stock reserved for issuance under our 2018 Stock Option and Incentive Plan will automatically increase each January 1 by 4% of the number of shares of common stock outstanding on the immediately preceding December 31 or such lesser number of shares determined by our

compensation committee. Unless our board of directors elects not to increase the number of shares available for future grant each year, our stockholders may experience additional dilution.

The holders of 38,296,526 shares of our common stock as of July 30, 2021 are entitled to rights with respect to the registration of their shares under the Securities Act. Registration of these shares under the Securities Act would result in the shares becoming freely tradable without restriction under the Securities Act, except for shares held by affiliates, as defined in Rule 144 under the Securities Act. Any sales of securities by these stockholders could have a material adverse effect on the trading price of our common stock.

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

The trading market for our common stock is influenced by research and reports that securities or industry analysts publish about us or our business. If one or more of the analysts who covers us downgrades our stock or publishes inaccurate or unfavorable research about our business, our stock price may decline. If one or more of these analysts ceases coverage of our company or fails to publish reports on us regularly, demand for our stock could decrease, which might cause our stock price and trading volume to decline.

We have broad discretion in the use of our existing cash, cash equivalents and investments and may not use them effectively.

Our management has broad discretion in the application of our cash, cash equivalents and investments. Because of the number and variability of factors that will determine our use of our cash, cash equivalents and investments, their ultimate use may vary substantially from their currently intended use. Our management might not apply our cash, cash equivalents and investments in ways that ultimately increase the value of our stockholders' investment. The failure by our management to apply these funds effectively could harm our business. Pending their use, we may invest our cash in short-term, investment-grade, interest-bearing securities. These investments may not yield a favorable return to our stockholders. If we do not use our resources in ways that enhance stockholder value, we may fail to achieve expected financial results, which could cause our stock price to decline.

Risks related to corporate governance

Anti-takeover provisions under our charter documents and Delaware law could delay or prevent a change of control which could limit the market price of our common stock and may prevent or frustrate attempts by our stockholders to replace or remove our current management.

Our amended and restated certificate of incorporation and amended and restated bylaws contain provisions that could delay or prevent a change of control of our company or changes in our board of directors that our stockholders might consider favorable. Some of these provisions include:

- a board of directors divided into three classes serving staggered three-year terms, such that not all members of the board will be elected at one time;
- a prohibition on stockholder action through written consent, which requires that all stockholder actions be taken at a meeting of our stockholders;
- a requirement that special meetings of stockholders be called only by the chairman of the board of directors, the chief executive officer, or by a majority of the total number of authorized directors;
- advance notice requirements for stockholder proposals and nominations for election to our board of directors;
- a requirement that no member of our board of directors may be removed from office by our stockholders except for cause and, in addition to any other vote required by law, upon the approval of not less than two-thirds of all outstanding shares of our voting stock then entitled to vote in the election of directors;

- a requirement of approval of not less than two-thirds of all outstanding shares of our voting stock to amend any bylaws by stockholder action or to amend specific provisions of our certificate of incorporation; and

- the authority of the board of directors to issue preferred stock on terms determined by the board of directors without stockholder approval and which preferred stock may include rights superior to the rights of the holders of common stock.

In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporate Law, which may prohibit certain business combinations with stockholders owning 15% or more of our outstanding voting stock. These anti-takeover provisions and other provisions in our amended and restated certificate of incorporation and amended and restated bylaws could make it more difficult for stockholders or potential acquirers to obtain control of our board of directors or initiate actions that are opposed by the then-current board of directors and could also delay or impede a merger, tender offer or proxy contest involving our company. These provisions could also discourage proxy contests and make it more difficult for our stockholders and other stockholders to elect directors of their choosing or cause us to take other corporate actions they desire. Any delay or prevention of a change of control transaction or changes in our board of directors could cause the market price of our common stock to decline.

Our amended and restated bylaws designate specific courts as the exclusive forum for certain litigation that may be initiated by our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us.

Pursuant to our amended and restated bylaws, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware is the sole and exclusive forum for state law claims for any state law claim for (1) any derivative action or proceeding brought on our behalf; (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers, or other employees to us or our stockholders; (3) any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law or our certificate of incorporation or bylaws; (4) any action to interpret, apply, enforce or determine the validity of our certificate of incorporation or bylaws; or (5) any action asserting a claim against us governed by the internal affairs doctrine, or the Delaware Forum Provision. The Delaware Forum Provision will not apply to any causes of action arising under the Securities Act or the Exchange Act. Our amended and restated bylaws further provide that, unless we consent in writing to the selection of an alternative forum, the United States District Court for the District of Massachusetts is the sole and exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act, or the Federal Forum Provision, or the rules and regulations promulgated thereunder, and of all suits in equity and actions at law brought to enforce any liability or duty created by the Securities Act or the rules and regulations thereunder, as our principal executive offices are located in Cambridge, Massachusetts. In addition, our amended and restated bylaws provide that any person or entity purchasing or otherwise acquiring any interest in shares of our Common Stock is deemed to have notice of and consented to the foregoing Delaware Forum Provision and Federal Forum Provision; provided, however, that stockholders cannot and will not be deemed to have waived our compliance with the U.S. federal securities laws and the rules and regulations thereunder.

We recognize that the Delaware Forum Provision and the Federal Forum Provision may impose additional litigation costs on stockholders in pursuing any such claims, particularly if the stockholders do not reside in or near the State of Delaware or the Commonwealth of Massachusetts. Additionally, the forum selection clauses in our amended and restated by-laws may limit our stockholders' ability to bring a claim in a judicial forum that they find favorable for disputes with us or our directors, officers or employees, which may discourage the filing of lawsuits against us and our directors, officers and employees even though an action, if successful, might benefit our stockholders. While the Delaware Supreme Court ruled in March 2020 that federal forum selection provisions purporting to require claims under the Securities Act be brought in federal court are "facially valid" under Delaware law, there is uncertainty as to whether other courts will enforce our Federal Forum Provision. The Federal Forum Provision may also impose additional litigation costs on us and/or our stockholders who assert that the provision is invalid or unenforceable, and if the Federal Forum Provision is found to be unenforceable, we may incur additional costs with resolving such matters. The Court of Chancery of the State of Delaware or the United States District Court for the District of Massachusetts may also reach

different judgments or results than would other courts, including courts where a stockholder considering an action may be located or would otherwise choose to bring the action, and such judgments may be more or less favorable to us than our stockholders.

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

Recent Sales of Unregistered Equity Securities

None.

Item 3. Defaults Upon Senior Securities

Not applicable.

Item 4. Mine Safety Disclosures

Not applicable.

Item 5. Other Information

None.

The exhibits filed as part of this Quarterly Report on Form 10-Q are set forth on the Exhibit Index, which Exhibit Index is incorporated herein by reference.

Item 6. Exhibits

3.1	Amended and Restated Certificate of Incorporation of Rubius Therapeutics, Inc. (Incorporated by reference to Exhibit 3.1 to the Registrant's Form 8-K (File No. 001-38586) filed on July 23, 2018).
3.2	Amended and Restated Bylaws of Rubius Therapeutics, Inc. (Incorporated by reference to Exhibit 3.2 to the Registrant's Form 8-K (File No. 001-38586) filed on July 23, 2018).
10.1*^	Second Amendment to Loan and Security Agreement between Rubius Therapeutics, Inc. and SLR Investment Corp. (formerly Solar Capital Ltd.) dated June 22, 2021.
10.2#	Employment Agreement between Rubius Therapeutics, Inc. and Dannielle Appelhans, dated July 26, 2021. (Incorporated by reference to Exhibit 10.1 to the Registrant's Form 8-K (File No. 001-38586) filed on July 29, 2021).
31.1*	Certification of Principal Executive Officer pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2*	Certification of Principal Financial Officer pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1†	Certification of Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2†	Certification of Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS*	Inline XBRL Instance Document (the instance 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 Calculation Linkbase Document.
101.DEF*	Inline XBRL Taxonomy Extension 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 (formatted as inline XBRL and contained in Exhibit 101)

* Filed herewith.

^ Certain schedules and similar attachments have been omitted pursuant to Item 601(a)(5) of Regulation S-K. The Company hereby undertakes to furnish on a supplemental basis copies of any of the omitted schedules upon request by the Commission.

# Indicates a management contract or any compensatory plan, contract or arrangement.

† This certification will not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), or otherwise subject to the liability of that section. Such certification will not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Exchange Act, except to the extent specifically incorporated by reference into such filing.

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.

RUBIUS THERAPEUTICS, INC.

Date: August 9, 2021

By: /s/ Pablo J. Cagnoni
Pablo J. Cagnoni, M.D.
Chief Executive Officer
(Principal Executive Officer)

Date: August 9, 2021

By: /s/ Jose Carmona
Jose Carmona
Chief Financial Officer
(Principal Financial Officer)

SECOND AMENDMENT TO LOAN AND SECURITY AGREEMENT

THIS **SECOND AMENDMENT TO LOAN AND SECURITY AGREEMENT** (this "**Amendment**"), dated as of June 22, 2021 (the "**Amendment Effective Date**"), is made among Rubius Therapeutics, Inc., a Delaware corporation (the "**Borrower**"), SLR Investment Corp., fka Solar Capital Ltd., a Maryland corporation ("**SLR**"), in its capacity as collateral agent (in such capacity, together with its successors and assigns in such capacity, "**Collateral Agent**") and the Lenders listed on Schedule 1.1 of the Loan and Security Agreement (as defined below) or otherwise a party hereto from time to time including SLR in its capacity as a Lender (each a "**Lender**" and collectively, the "**Lenders**").

Borrower, the Lenders and Collateral Agent are parties to a Loan and Security Agreement dated as of December 21, 2018 (as amended, restated or modified from time to time, the "**Loan and Security Agreement**"). Borrower has requested that the Lenders agree to certain amendments to the Loan and Security Agreement. The Lenders have agreed to such request, subject to the terms and conditions hereof.

Accordingly, the parties hereto agree as follows:

SECTION 1 Definitions; Interpretation.

(a) **Terms Defined in Loan and Security Agreement**. All capitalized terms used in this Amendment (including in the recitals hereof) and not otherwise defined herein shall have the meanings assigned to them in the Loan and Security Agreement.

(b) **Interpretation**. The rules of interpretation set forth in Section 1.1 of the Loan and Security Agreement shall be applicable to this Amendment and are incorporated herein by this reference.

SECTION 2 Amendments to the Loan and Security Agreement.

(a) The Loan and Security Agreement shall be amended as follows effective as of the Amendment Effective Date:

(i) Amended Definitions. The following definitions are hereby amended as follows:

"**Amortization Date**" is July 1, 2024.

"**Applicable Rate**" means (a) 5.50% plus (b) the greater of (i) 2.10% or (ii) the rate per annum rate published by the Intercontinental Exchange Benchmark Administration Ltd. (the "**Service**") (or on any successor or substitute page of such Service, or any successor to or substitute for such Service, as determined by Collateral Agent) for a term of one month, which determination by Collateral Agent shall be conclusive in the absence of manifest error; provided that if, at any time, Lenders notify Collateral Agent that Lenders have determined that (x) Lenders are unable to determine or ascertain such rate, (y) the applicable regulator has made public statements to the effect that the rate published by the Service is no longer used for determining interest rates for loans or (z) by reason of circumstances affecting the foreign exchange and interbank markets generally, deposits in eurodollars in the applicable amounts or for the relative maturities are not being offered for such period, then the Applicable Rate shall be equal to an alternate benchmark rate and spread agreed between Collateral Agent and Borrowers (which may include SOFR, to the extent publicly available quotes of SOFR exist at the relevant time), giving due consideration to (A) market convention or (B) selection, endorsement or recommendation by a relevant Governmental Body. Such alternative benchmark rate and spread shall be binding unless the Required Lenders object within five (5) days following notification of such amendment.

"**Maturity Date**" is June 1, 2026.

"**Obligations**" are all of Borrower's obligations to pay when due any debts, principal, interest, Lenders' Expenses, the Prepayment Premium, all fees under the Fee Letter, the Second Amendment Fee and any other amounts Borrower owes the Collateral Agent or the Lenders now or later, in connection with, related to, following, or arising from, out of or under, this Agreement or, the other Loan Documents, or otherwise, and including interest accruing after Insolvency Proceedings begin (whether or not allowed) and debts, liabilities, or obligations of Borrower assigned to the Lenders and/or Collateral Agent in connection with this Agreement and the other Loan Documents, and the performance of Borrower's duties under the Loan Documents.

"**Prepayment Premium**" is, with respect to any Term Loan subject to prepayment prior to the Maturity Date, whether by mandatory or voluntary prepayment, acceleration or otherwise, an additional fee payable to the Lenders in amount equal to:

(i) for a prepayment made on or after the Second Amendment Effective Date through and including the first anniversary of the Second Amendment Effective Date, one percent (1.00%) of the principal amount of such Term Loan prepaid;

(ii) for a prepayment made on any date which is after the first anniversary of the Second Amendment Effective Date and through and including the second anniversary of the Second Amendment Effective Date, one half of one percent (0.50%) of the principal amount of such Term Loan prepaid; and

(iii) for a prepayment made on any date which is after the second anniversary of the Second Amendment Effective Date prior to the Maturity Date, one quarter of one percent (0.25%) of the principal amount of the Term Loans prepaid.

Notwithstanding the foregoing, Collateral Agent and Lender agree to waive the Prepayment Premium if SLR (in its sole and absolute discretion) agrees in writing to refinance the Term Loans prior to the Maturity Date.

(ii) New Definitions.

"**Second Amendment**" means that certain Second Amendment to Loan and Security Agreement, Fee Letter and Exit Fee Agreement, dated as of the Second Amendment Effective Date, by and among Borrower, the lenders party thereto from time to time and Collateral Agent.

"**Second Amendment Effective Date**" means June 22, 2021.

"**Second Amendment Fee**" means $150,000 which shall be fully-earned and due and payable on the Second Amendment Effective Date.

"**Fourth Draw Period**" is the period commencing on the Second Amendment Effective Date and ending on the earlier of (a) the Maturity Date or (b) the occurrence of an Event of Default.

(iii) Section 1.4. Section 1.4 of the Loan and Security Agreement is hereby amended by adding the new definition set forth below to the table therein.

"**Term D Loan**"	Section 2.2(a)(iv)

(iv) Section 2.2. Section 2.2(a) of the Loan and Security Agreement is hereby amended by amending and restated clause (iii) as set forth below and adding new clause (iv) as set forth below.

(iii) Subject to the terms and conditions of this Agreement, the Lenders agree, severally and not jointly, during the Third Draw Period, to make term loans to Borrower in an aggregate principal amount of up to Twenty Five Million Dollars ($25,000,000.00) according to each Lender's Term C Loan commitment as set forth on Schedule 1.1 hereto (such term loans are hereinafter referred to

singly as a "**Term C Loan**", and collectively as the "**Term C Loans**"). After repayment of any Term C Loan, no Term C Loan may be re-borrowed.

(iv) Subject to the terms and conditions of this Agreement, the Lenders agree, severally and not jointly, during the Fourth Draw Period, to consider, in their sole and unfettered discretion, making term loans to Borrower in an aggregate principal amount of up to Thirty Five Million Dollars ($35,000,000.00) according to each Lender's Term D Loan amount as set forth on Schedule 1.1 hereto (such term loans are hereinafter referred to singly as a "**Term D Loan**", and collectively as the "**Term D Loans**"; each Term A Loan, Term B Loan, Term C Loan or Term D Loan is hereinafter referred to singly as a "**Term Loan**" and the Term A Loans, the Term B Loans, the Term C Loans and the Term D Loans are hereinafter referred to collectively as the "**Term Loans**"). After repayment of any Term D Loan, no Term D Loan may be re-borrowed.

(v) Section 2.4. Section 2.4 of the Loan and Security Agreement is hereby amended by adding new clause (d) as follows:

(d) Second Amendment Fee. The Second Amendment Fee, when due hereunder to be shared between the Lenders in accordance with their respective Pro Rata Shares.

(vi) Schedule 1.1. Schedule 1.1 to the Loan and Security Agreement is hereby amended and restated as set forth on Exhibit A.

(b) **References Within Loan and Security Agreement**. Each reference in the Loan and Security Agreement to "this Agreement" and the words "hereof," "herein," "hereunder," or words of like import, shall mean and be a reference to the Loan and Security Agreement as amended by this Amendment.

SECTION 3 Conditions of Effectiveness. The effectiveness of this Amendment shall be subject to the satisfaction of each of the following conditions precedent:

(a) **Fees and Expenses**. The Borrower shall have paid (i) all invoiced costs and expenses then due in accordance with Section 5(e), and (ii) all other fees, costs and expenses, if any, due and payable as of the Amendment Effective Date under the Loan and Security Agreement.

(b) **This Amendment**. Collateral Agent shall have received this Amendment, executed by Collateral Agent, the Lenders and the Borrower.

(c) **Perfection Certificate**. Collateral Agent and the Lenders shall have received an updated Perfection Certificate attached hereto as Exhibit B.

(d) **Officer's Certificate**. Collateral Agent shall have received a certificate of an officer of Borrower with respect to incumbency and resolutions authorizing the execution and delivery of this Amendment, in form acceptable to Collateral Agent and the Lenders.

(e) **Legal Opinion**. A legal opinion of Borrower's counsel, in form and substance satisfactory to Collateral Agent.

(f) **Representations and Warranties; No Default**. On the Amendment Effective Date, after giving effect to the amendment of the Loan and Security Agreement contemplated hereby:

(i) The representations and warranties contained in Section 4 shall be true and correct on and as of the Amendment Effective Date as though made on and as of such date; and

(ii) There exist no Events of Default or events that with the passage of time would result in an Event of Default.

SECTION 4 **Representations and Warranties**. To induce the Lenders to enter into this Amendment, the Borrower hereby confirms, as of the date hereof, (a) that the representations and warranties made by it in Section 5 of the Loan and Security Agreement and in the other Loan Documents are true and correct in all material respects; provided, however, that such materiality qualifier shall not be applicable to any representations and warranties that already are qualified or modified by materiality in the text thereof; (b) that there has not been and there does not exist a Material Adverse Change; and (c) that the information included in the Perfection Certificate delivered to Collateral Agent on the Effective Date remains true and correct. For the purposes of this Section 4, (i) each reference in Section 5 of the Loan and Security Agreement to "this Agreement," and the words "hereof," "herein," "hereunder," or words of like import in such Section, shall mean and be a reference to the Loan and Security Agreement as amended by this Amendment, and (ii) any representations and warranties which relate solely to an earlier date shall not be deemed confirmed and restated as of the date hereof (provided that such representations and warranties shall be true, correct and complete in all material respects as of such earlier date).

SECTION 5 **Miscellaneous.**

(a) **Loan Documents Otherwise Not Affected; Reaffirmation; No Novation**.

(i) Except as expressly amended pursuant hereto or referenced herein, the Loan and Security Agreement and the other Loan Documents shall remain unchanged and in full force and effect and are hereby ratified and confirmed in all respects. The Lenders' and Collateral Agent's execution and delivery of, or acceptance of, this Amendment shall not be deemed to create a course of dealing or otherwise create any express or implied duty by any of them to provide any other or further amendments, consents or waivers in the future.

(ii) Borrower hereby expressly (1) reaffirms, ratifies and confirms its Obligations under the Loan and Security Agreement and the other Loan Documents, (2) reaffirms, ratifies and confirms the grant of security under Section 4.1 of the Loan and Security Agreement, (3) reaffirms that such grant of security in the Collateral secures all Obligations under the Loan and Security Agreement, and with effect from (and including) the Amendment Effective Date, such grant of security in the Collateral: (x) remains in full force and effect notwithstanding the amendments expressly referenced herein; and (y) secures all Obligations under the Loan and Security Agreement, as amended by this Amendment, and the other Loan Documents, (4) agrees that this Amendment shall be a "Loan Document" under the Loan and Security Agreement and (5) agrees that the Loan and Security Agreement and each other Loan Document shall remain in full force and effect following any action contemplated in connection herewith.

(iii) This Amendment is not a novation and the terms and conditions of this Amendment shall be in addition to and supplemental to all terms and conditions set forth in the Loan Documents. Nothing in this Amendment is intended, or shall be construed, to constitute an accord and satisfaction of Borrower's Obligations under or in connection with the Loan and Security Agreement and any other Loan Document or to modify, affect or impair the perfection or continuity of Collateral Agent's security interest in, (on behalf of itself and the Lenders) security titles to or other liens on any Collateral for the Obligations.

(b) **Conditions**. For purposes of determining compliance with the conditions specified in Section 4, each Lender that has signed this Amendment shall be deemed to have consented to, approved or accepted or to be satisfied with, each document or other matter required thereunder to be consented to or approved by or acceptable or satisfactory to a Lender unless Collateral Agent shall have received notice from such Lender prior to the Amendment Effective Date specifying its objection thereto.

(c) **Release**. In consideration of the agreements of Collateral Agent and each Lender contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Borrower, on behalf of itself and its successors, assigns, and other legal representatives, hereby fully, absolutely, unconditionally and irrevocably releases, remises and forever discharges Collateral Agent and each Lender, and its successors and assigns, and its present and former shareholders, affiliates, subsidiaries, divisions, predecessors, directors, officers, attorneys, employees, agents and other representatives (Collateral Agent, Lenders and all such other persons being hereinafter referred to collectively as the "**Releasees**" and individually as a "**Releasee**"), of and from all demands, actions, causes of action, suits, covenants, contracts, controversies, agreements, promises, sums of money, accounts, bills, reckonings, damages and any and all other claims, counterclaims, defenses, rights of set-off, demands and liabilities whatsoever of every name and nature, known or unknown, suspected or unsuspected, both at

law and in equity, which Borrower, or any of its successors, assigns, or other legal representatives may now or hereafter own, hold, have or claim to have against the Releasees or any of them for, upon, or by reason of any circumstance, action, cause or thing whatsoever which arises at any time on or prior to the day and date of this Amendment, including, without limitation, for or on account of, or in relation to, or in any way in connection with the Loan and Security Agreement, or any of the other Loan Documents or transactions thereunder or related thereto. Borrower understands, acknowledges and agrees that the release set forth above may be pleaded as a full and complete defense and may be used as a basis for an injunction against any action, suit or other proceeding which may be instituted, prosecuted or attempted in breach of the provisions of such release. Borrower agrees that no fact, event, circumstance, evidence or transaction which could now be asserted or which may hereafter be discovered shall affect in any manner the final, absolute and unconditional nature of the release set forth above.

(d) **No Reliance**. The Borrower hereby acknowledges and confirms to Collateral Agent and the Lenders that the Borrower is executing this Amendment on the basis of its own investigation and for its own reasons without reliance upon any agreement, representation, understanding or communication by or on behalf of any other Person.

(e) **Costs and Expenses**. The Borrower agrees to pay to Collateral Agent on the Amendment Effective Date, the reasonable out-of-pocket costs and expenses of Collateral Agent and the Lenders party hereto, and the reasonable and documented fees and disbursements of counsel to Collateral Agent and the Lenders party hereto (including reasonable and documented allocated costs of internal counsel), in connection with the negotiation, preparation, execution and delivery of this Amendment and any other documents to be delivered in connection herewith on the Amendment Effective Date or after such date.

(f) **Binding Effect**. This Amendment binds and is for the benefit of the successors and permitted assigns of each party.

(g) **Governing Law**. **THIS AMENDMENT AND THE RIGHTS AND OBLIGATIONS OF THE PARTIES HEREUNDER SHALL IN ALL RESPECTS BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH, THE INTERNAL LAWS OF THE STATE OF NEW YORK (WITHOUT REGARD TO THE CONFLICT OF LAWS PRINCIPLES THAT WOULD RESULT IN THE APPLICATION OF ANY LAWS OTHER THAN THE LAWS OF THE STATE OF NEW YORK), INCLUDING ALL MATTERS OF CONSTRUCTION, VALIDITY AND PERFORMANCE, REGARDLESS OF THE LOCATION OF THE COLLATERAL.**

(h) **Complete Agreement; Amendments; Exit Fee Agreement**. This Amendment and the Loan Documents represent the entire agreement about this subject matter and supersede prior negotiations or agreements with respect to such subject matter. All prior agreements, understandings, representations, warranties, and negotiations between the parties about the subject matter of this Amendment and the Loan Documents merge into this Amendment and the Loan Documents. For the avoidance of doubt and notwithstanding anything to the contrary in this Amendment, Borrower (a) reaffirms its obligations under the Exit Fee Agreement, including without limitation its obligation to pay the Exit Fee (as defined in the Exit Fee Agreement) if and when due thereunder, and (b) agrees that the defined term "Loan Agreement" as defined in the Exit Fee Agreement shall on and after the Amendment Effective Date mean the Loan and Security Agreement as amended by this Amendment and as may be amended, restated or modified from time to time on or after the Amendment Effective Date.

(i) **Severability of Provisions.** Each provision of this Amendment is severable from every other provision in determining the enforceability of any provision.

(j) **Counterparts**. This Amendment may be executed in any number of counterparts and by different parties on separate counterparts, each of which, when executed and delivered, is an original, and all taken together, constitute one Amendment. Delivery of an executed counterpart of a signature page of this Amendment by facsimile, portable document format (.pdf) or other electronic transmission will be as effective as delivery of a manually executed counterpart hereof.

(k) **Loan Documents**. This Amendment and the documents related thereto shall constitute Loan Documents.

(l) **Electronic Execution of Certain Other Documents**. The words "execution," "execute", "signed," "signature," and words of like import in or related to any document to be signed in connection with this Amendment and the transactions contemplated hereby (including without limitation assignments, assumptions, amendments, waivers and consents) shall be deemed to include electronic signatures, the electronic matching of assignment terms and contract formations on electronic platforms approved by the Collateral Agent, or the keeping of records in electronic form, each of which shall be of the same legal effect, validity or enforceability as a manually executed signature or the use of a paper-based recordkeeping system, as the case may be, to the extent and as provided for in any applicable law, including the Federal Electronic Signatures in Global and National Commerce Act, the New York State Electronic Signatures and Records Act, or any other similar state laws based on the Uniform Electronic Transactions Act.

[Balance of Page Intentionally Left Blank; Signature Pages Follow]

IN WITNESS WHEREOF, the parties hereto have duly executed this Amendment, as of the date first above written.

BORROWER:

RUBIUS THERAPEUTICS, INC.,
as Borrower

By: /s/ Jose Carmona
Name: Jose Carmona
Title: Chief Financial Officer

COLLATERAL AGENT:

SLR INVESTMENT CORP.,
as Collateral Agent

By: /s/ Anthony J. Storino
Name: Anthony J. Storino
Title: Authorized Signatory

LENDERS:

SLR INVESTMENT CORP.,
as Lender

By: /s/ Anthony J. Storino
Name: Anthony J. Storino
Title: Authorized Signatory

SUNS SPV LLC,
as Lender

By: /s/ Anthony J. Storino
Name: Anthony J. Storino
Title: Authorized Signatory

SCP PRIVATE CREDIT INCOME FUND SPV LLC
as Lender

By: /s/ Anthony J. Storino
Name: Anthony J. Storino
Title: Authorized Signatory

SCP PRIVATE CREDIT INCOME BDC SPV LLC
as Lender

By: /s/ Anthony J. Storino
Name: Anthony J. Storino
Title: Authorized Signatory

SCP PRIVATE CORPORATE LENDING FUND SPV LLC
as Lender

By: /s/ Anthony J. Storino
Name: Anthony J. Storino
Title: Authorized Signatory

SCP CAYMAN DEBT MASTER FUND SPV LLC
as Lender

By: /s/ Anthony J. Storino

Name: Anthony J. Storino
Title: Authorized Signatory

[Signature Page to Second Amendment (Solar/Rubius)]

Exhibit A

SCHEDULE 1.1

Lenders, Commitments and Amounts

	Term A Loans	
Lender	**Term Loan Commitment**	**Commitment Percentage**
SLR INVESTMENT CORP.	$13,430,457.00	53.72%
SUNS SPV LLC	$2,060,528.00	8.24%
SCP PRIVATE CREDIT INCOME FUND SPV LLC	$3,493,239.00	13.97%
SCP PRIVATE CREDIT INCOME BDC SPV LLC	$2,623,954.00	10.50%
SCP PRIVATE CORPORATE LENDING FUND SPV LLC	$2,079,845.00	8.32%
SCP CAYMAN DEBT MASTER FUND SPV LLC	$1,311,977.00	5.25%
TOTAL	**$25,000,000.00**	**100.00%**

	Term B Loans	
Lender	**Term Loan Commitment**	**Commitment Percentage**
SLR INVESTMENT CORP.	$13,430,457.00	53.72%
SUNS SPV LLC	$2,060,528.00	8.24%
SCP PRIVATE CREDIT INCOME FUND SPV LLC	$3,493,239.00	13.97%
SCP PRIVATE CREDIT INCOME BDC SPV LLC	$2,623,954.00	10.50%
SCP PRIVATE CORPORATE LENDING FUND SPV LLC	$2,079,845.00	8.32%
SCP CAYMAN DEBT MASTER FUND SPV LLC	$1,311,977.00	5.25%
TOTAL	**$25,000,000.00**	**100.00%**

	Term C Loans	
Lender	**Term Loan Commitment**	**Commitment Percentage**
SLR INVESTMENT CORP.	$13,430,457.00	53.72%
SUNS SPV LLC	$2,060,528.00	8.24%
SCP PRIVATE CREDIT INCOME FUND SPV LLC	$3,493,239.00	13.97%
SCP PRIVATE CREDIT INCOME BDC SPV LLC	$2,623,954.00	10.50%
SCP PRIVATE CORPORATE LENDING FUND SPV LLC	$2,079,845.00	8.32%
SCP CAYMAN DEBT MASTER FUND SPV LLC	$1,311,977.00	5.25%
TOTAL	**$25,000,000.00**	**100.00%**

	Total Commitments (all committed Term Loans)	
Lender	**Term Loan Commitment**	**Commitment Percentage**
SLR INVESTMENT CORP.	$40,291,371.00	53.72%
SUNS SPV LLC	$6,181,584.00	8.24%
SCP PRIVATE CREDIT INCOME FUND SPV LLC	$10,479,717.00	13.97%
SCP PRIVATE CREDIT INCOME BDC SPV LLC	$7,871,862.00	10.50%
SCP PRIVATE CORPORATE LENDING FUND SPV LLC	$6,239,535.00	8.32%
SCP CAYMAN DEBT MASTER FUND SPV LLC	$3,935,931.00	5.25%
TOTAL	**$75,000,000.00**	**100.00%**

	Term D Loans*	
Lender	**Term Loan Amount**	**Amount Percentage**
SLR INVESTMENT CORP.	$18,802,640.00	53.72%
SUNS SPV LLC	$2,884,739.00	8.24%
SCP PRIVATE CREDIT INCOME FUND SPV LLC	$4,890,535.00	13.97%
SCP PRIVATE CREDIT INCOME BDC SPV LLC	$3,673,535.00	10.50%
SCP PRIVATE CORPORATE LENDING FUND SPV LLC	$2,911,783.00	8.32%
SCP CAYMAN DEBT MASTER FUND SPV LLC	$1,836,768.00	5.25%
TOTAL	**$35,000,000.00**	**100.00%**

* Funding of the Term D Loans subject to approval by the Lenders in their sole and unfettered discretion.

	Total Amount (all Term Loans)	
Lender	**Term Loan Amount**	**Amount Percentage**
SLR INVESTMENT CORP.	$59,094,011.00	53.72%
SUNS SPV LLC	$9,066,323.00	8.24%
SCP PRIVATE CREDIT INCOME FUND SPV LLC	$15,370,252.00	13.97%
SCP PRIVATE CREDIT INCOME BDC SPV LLC	$11,545,397.00	10.50%
SCP PRIVATE CORPORATE LENDING FUND SPV LLC	$9,151,318.00	8.32%
SCP CAYMAN DEBT MASTER FUND SPV LLC	$5,772,699.00	5.25%
TOTAL	**$110,000,000.00**	**100.00%**

Exhibit B

Perfection Certificate

EXHIBIT 31.1

CERTIFICATION PURSUANT TO SECURITIES AND EXCHANGE ACT OF 1934
RULE 13A-14 AS ADOPTED PURSUANT TO SECTION 302 OF SARBANES-OXLEY ACT OF 2002

CERTIFICATION

I, Pablo J. Cagnoni, M.D., certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Rubius Therapeutics, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: August 9, 2021

By: /s/ Pablo J. Cagnoni
Pablo J. Cagnoni, M.D.
Chief Executive Officer and President
(Principal Executive Officer)

EXHIBIT 31.2

CERTIFICATION PURSUANT TO SECURITIES AND EXCHANGE ACT OF 1934
RULE 13A-14 AS ADOPTED PURSUANT TO SECTION 302 OF SARBANES-OXLEY ACT OF 2002

CERTIFICATION

I, Jose Carmona, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Rubius Therapeutics, Inc.;

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

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

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

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

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

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

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

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

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

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

Date: August 9, 2021

By: /s/ Jose Carmona
Jose Carmona
Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,

AS ADOPTED PURSUANT TO

SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q of Rubius Therapeutics, Inc. (the "Company") for the period ended June 30, 2021, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Pablo J. Cagnoni, M.D., Chief Executive Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: August 9, 2021

By: /s/ Pablo J. Cagnoni
Pablo J. Cagnoni, M.D.
Chief Executive Officer and President
(Principal Executive Officer)

Exhibit 32.2

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,

AS ADOPTED PURSUANT TO

SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q of Rubius Therapeutics, Inc. (the "Company") for the period ended June 30, 2021, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Jose Carmona, Chief Financial Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: August 9, 2021

By: /s/ Jose Carmona
Jose Carmona
Chief Financial Officer
(Principal Financial Officer)