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, 2022

or

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

For the transition period from _________ to _________

Commission File Number: 001-40592

Rapid Micro Biosystems, Inc.

(Exact name of registrant as specified in its charter)

Delaware	20-8121647
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification Number)

1001 Pawtucket Boulevard West, Suite 280
Lowell, MA 01854
(Address of Principal Executive Offices)

(978) 349-3200
(Registrant's telephone number)

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

Title of Each Class	Trading symbol	Name of Exchange on which registered
Class A common stock, $0.01 par value per share	RPID	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 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 August 8, 2022, there were 36,389,073 of the registrant's Class A common stock, par value $0.01, outstanding.
As of August 8, 2022, there were 5,553,379 of the registrant's Class B common stock, par value $0.01, outstanding.

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FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q contains forward-looking statements. We intend such forward-looking statements to be covered by the safe harbor provisions for forward-looking statements contained in Section 27A of the Securities Act of 1933, as amended (the “Securities Act”), and Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”). All statements other than statements of historical facts contained in this Quarterly Report on Form 10-Q may be forward-looking statements. These forward-looking statements are often, but not always, made through the use of words or phrases such as “may,” “will,” “should,” “expects,” “plans,” “anticipates,” “could,” “intends,” “targets,” “projects,” “contemplates,” “believes,” “estimates,” “forecasts,” “predicts,” “potential” or “continue” or the negative of these terms or other similar expressions. Forward-looking statements contained in this Quarterly Report on Form 10-Q include, but are not limited to, statements regarding:

- our business strategy for our Growth Direct platform and systems;
- our future results of operations and financial position, including our expectations regarding revenue, operating expenses and ability to generate cash flow;
- our expectations and assumptions related to our future funding requirements and available capital resources, which may be impacted by market uptake of our Growth Direct system, our research and development activities and the expansion of our sales, marketing, manufacturing and distribution capabilities;
- our ability to maintain and expand our customer base for our Growth Direct platform and systems;
- our exploration of strategic alternatives for the Company;
- the effectiveness of enhancements of our sales processes;
- the anticipated impact of our restructuring on the Company;
- anticipated trends and growth rates in our business and in the markets in which we operate;
- our research and development activities and prospective new features, products and product approvals;
- our ability to anticipate market needs and successfully develop new and enhanced solutions to meet those needs, including prospective products;
- our expectations regarding the potential impact of the ongoing COVID-19 pandemic on our business, operations and the markets in which we and our customers operate;
- our expectations regarding the potential impact of inflation and deflation and corresponding fluctuations in interest rates on our business and operating costs;
- our ability to adequately protect our intellectual property; and
- our ability to hire and retain necessary qualified employees to grow our business and expand our operations.

We caution you that the foregoing list may not contain all of the forward-looking statements made in this Quarterly Report on Form 10-Q. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our business, financial condition and results of operations. Forward-looking statements involve known and unknown risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements, including, but not limited to, the important factors discussed in Part I, Item 1A of the Company’s Annual Report on Form 10-K for the year ended December 31, 2021 under the heading “Risk Factors.” The forward-looking statements in this Quarterly Report on Form 10-Q are based upon information available to us as of the date of this Quarterly Report on Form 10-Q, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements.

You should read this Quarterly Report on Form 10-Q and the documents that we reference in this Quarterly Report on Form 10-Q and have filed as exhibits to this Quarterly Report on Form 10-Q with the understanding that our actual future results, levels of activity, performance and achievements may be materially different from what we expect. These forward-looking statements speak only as of the date of this Quarterly Report on Form 10-Q. Except as required by applicable law, we undertake no obligation to publicly update or revise any forward-looking statements contained in this Quarterly Report on Form 10-Q, whether as a result of any new information, future events or otherwise.

TRADEMARKS

Solely for convenience, our trademarks and trade names in this report are referred to without the ® and ™ symbols, but such references should not be construed as any indicator that we will not assert, to the fullest extent under applicable law, our rights thereto.

PART I —FINANCIAL INFORMATION

Item 1. Financial Statements

RAPID MICRO BIOSYSTEMS, INC.
Condensed consolidated balance sheets
(Unaudited)
(In thousands, except share and per share amounts)

	June 30, 2022	December 31, 2021
Assets		
Current assets:		
Cash and cash equivalents	$ 49,720	$ 178,387
Short-term investments	94,371	15,110
Accounts receivable	4,100	5,005
Inventory	21,293	15,671
Prepaid expenses and other current assets	1,999	3,951
Total current assets	171,483	218,124
Property and equipment, net	12,649	11,304
Right-of-use assets, net	7,530	—
Long-term investments	22,816	9,966
Other long-term assets	1,381	1,491
Restricted cash	284	284
Total assets	$ 216,143	$ 241,169
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 2,822	$ 3,944
Accrued expenses and other current liabilities	5,281	10,917
Deferred revenue	3,918	3,305
Lease liabilities, short-term	729	—
Total current liabilities	12,750	18,166
Deferred rent, long term	—	813
Lease liabilities, long-term	7,728	—
Other long-term liabilities	698	1,210
Total liabilities	21,176	20,189
Commitments and contingencies (Note 17)		
Stockholders' equity:		
Class A common stock, $0.01 par value; 210,000,000 shares authorized at June 30, 2022 and December 31, 2021; 36,389,073 shares and 34,564,040 shares issued and outstanding at June 30, 2022 and December 31, 2021, respectively	365	346
Class B common stock, $0.01 par value; 10,000,000 shares authorized at June 30, 2022 and December 31, 2021; 5,553,379 shares and 6,903,379 shares issued and outstanding at June 30, 2022 and December 31, 2021, respectively	55	69
Preferred stock, $0.01 par value: 10,000,000 shares authorized at June 30, 2022 and December 31, 2021; zero shares issued and outstanding at June 30, 2022 and December 31, 2021	—	—
Additional paid-in capital	538,598	535,693
Accumulated deficit	(343,132)	(315,112)
Accumulated other comprehensive loss	(919)	(16)
Total stockholders' equity	194,967	220,980
Total liabilities and stockholders' equity	$ 216,143	$ 241,169

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

RAPID MICRO BIOSYSTEMS, INC.
Condensed consolidated statements of operations
(Unaudited)
(In thousands, except share and per share amounts)

	Three Months Ended June 30, 2022	Three Months Ended June 30, 2021	Six Months Ended June 30, 2022	Six Months Ended June 30, 2021
Revenue:				
Product revenue	$ 2,440	$ 4,088	$ 5,003	$ 7,806
Service revenue	1,420	1,606	3,017	2,673
Non-commercial revenue	—	436	—	646
Total revenue	3,860	6,130	8,020	11,125
Costs and operating expenses:				
Cost of product revenue	3,235	6,092	7,593	11,602
Cost of service revenue	1,846	1,344	3,572	2,481
Cost of non-commercial revenue	—	472	—	886
Research and development	2,965	2,337	6,490	4,485
Sales and marketing	3,484	3,122	6,940	5,397
General and administrative	6,404	3,625	12,498	6,827
Total costs and operating expenses	17,934	16,992	37,093	31,678
Loss from operations	(14,074)	(10,862)	(29,073)	(20,553)
Other income (expense):				
Interest expense	(10)	(924)	(21)	(1,856)
Change in fair value of preferred stock warrant liability	—	(35)	—	(11,483)
Other income (expense), net	381	8	484	(3)
Total other income (expense), net	371	(951)	463	(13,342)
Loss before income taxes	(13,703)	(11,813)	(28,610)	(33,895)
Income tax (benefit) expense	(613)	18	(590)	37
Net loss	(13,090)	(11,831)	(28,020)	(33,932)
Accretion of redeemable convertible preferred stock to redemption value	—	(1,184)	—	(1,971)
Cumulative redeemable convertible preferred stock dividends	—	(885)	—	(2,296)
Net loss attributable to common stockholders — basic and diluted	$ (13,090)	$ (13,900)	$ (28,020)	$ (38,199)
Net loss per share attributable to Class A and Class B common stockholders — basic and diluted	$ (0.31)	$ (20.01)	$ (0.66)	$ (57.17)
Weighted average common shares outstanding — basic and diluted	42,494,055	694,698	42,346,607	668,180

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

RAPID MICRO BIOSYSTEMS, INC.
Condensed consolidated statements of comprehensive loss
(Unaudited)
(In thousands)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Net loss	$ (13,090)	$ (11,831)	$ (28,020)	$ (33,932)
Other comprehensive income:				
Unrealized loss on short-term investments, net of tax	(315)	(1)	(903)	(1)
Comprehensive loss	$ (13,405)	$ (11,832)	$ (28,923)	$ (33,933)

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

RAPID MICRO BIOSYSTEMS, INC.
Condensed consolidated statements of stockholders' equity
(Unaudited)
(In thousands, except share amounts)

	Preferred stock		Class A Common stock		Class B Common stock		Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive loss	Total
	Shares	Amount	Shares	Amount	Shares	Amount				
Balances at December 31, 2021	—	$ —	34,564,040	$ 346	6,903,379	$ 69	$ 535,693	$ (315,112)	$ (16)	$220,980
Conversion of Class B common stock to Class A common stock	—	—	1,350,000	14	(1,350,000)	(14)	—	—	—	—
Restricted stock award liability accretion	—	—	—	—	—	—	154	—	—	154
Issuance of Class A common stock upon exercise of common stock options	—	—	475,033	5	—	—	466	—	—	471
Stock-based compensation expense	—	—	—	—	—	—	983	—	—	983
Net loss	—	—	—	—	—	—	—	(14,930)	—	(14,930)
Other comprehensive loss	—	—	—	—	—	—	—	—	(588)	(588)
Balances at March 31, 2022	—	$ —	36,389,073	$ 365	5,553,379	$ 55	$ 537,296	$ (330,042)	$ (604)	$207,070
Restricted stock award liability accretion	—	—	—	—	—	—	44	—	—	44
Stock-based compensation expense	—	—	—	—	—	—	1,258	—	—	1,258
Net loss	—	—	—	—	—	—	—	(13,090)	—	(13,090)
Other comprehensive loss	—	—	—	—	—	—	—	—	(315)	(315)
Balances at June 30, 2022	—	$ —	36,389,073	$ 365	5,553,379	$ 55	$ 538,598	$ (343,132)	$ (919)	$194,967

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

RAPID MICRO BIOSYSTEMS, INC.
Condensed consolidated statements of stockholders' deficit
(Unaudited), continued
(In thousands, except share amounts)

	Redeemable convertible preferred stock		Class A Common stock		Class B Common stock		Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive income (loss)	Total
	Shares	Amount	Shares	Amount	Shares	Amount				
Balances at December 31, 2020	133,021,640	$ 151,826	612,850	$ 6	—	—	$ 114,575	$ (241,588)	$ 1	$ (127,006)
Issuance of Series D1 redeemable convertible preferred stock, net of issuance costs of $1,278	22,086,725	78,338	—	—	—	—	—	—	—	—
Issuance of Series D2 redeemable convertible preferred stock, net of issuance costs of $19	413,268	1,470	—	—	—	—	—	—	—	—
Accretion of redeemable convertible preferred stock to redemption value	—	787	—	—	—	—	(787)	—	—	(787)
Cumulative redeemable convertible preferred stock dividends	—	1,411	—	—	—	—	(1,411)	—	—	(1,411)
Issuance of Class A common stock upon exercise of common stock options	—	—	67,418	1	—	—	66	—	—	67
Issuance of restricted Class A common stock awards	—	—	248,903	2	—	—	(2)	—	—	—
Stock-based compensation expense	—	—	—	—	—	—	191	—	—	191
Net loss	—	—	—	—	—	—	—	(22,101)	—	(22,101)
Balances at March 31, 2021	155,521,633	$ 233,832	929,171	$ 9	—	—	$ 112,632	$ (263,689)	$ 1	$ (151,047)
Series D1 issuance costs	—	(64)	—	—	—	—	—	—	—	—
Series D2 issuance costs	—	(1)	—	—	—	—	—	—	—	—
Accretion of redeemable convertible preferred stock to redemption value	—	1,184	—	—	—	—	(1,184)	—	—	(1,184)
Cumulative redeemable convertible preferred stock dividends	—	885	—	—	—	—	(885)	—	—	(885)
Issuance of Class A common stock upon exercise of common stock options	—	—	37,146	1	—	—	31	—	—	32
Stock-based compensation expense	—	—	—	—	—	—	390	—	—	390
Net loss	—	—	—	—	—	—	—	(11,831)	—	(11,831)
Other comprehensive income	—	—	—	—	—	—	—	—	(1)	(1)
Balances at June 30, 2021	155,521,633	$ 235,836	966,317	$ 10	—	$ —	$ 110,984	$ (275,520)	$ —	$ (164,526)

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

RAPID MICRO BIOSYSTEMS, INC.
Condensed consolidated statements of cash flows
(Unaudited)
(In thousands)

	Six Months Ended June 30,	
	2022	**2021**
Cash flows from operating activities:		
Net loss	$ (28,020)	$ (33,932)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization expense	1,243	696
Stock-based compensation expense	2,241	581
Change in fair value of preferred stock warrant liability	—	11,483
Provision recorded for inventory	49	38
Noncash lease expense	549	—
Noncash interest expense	—	295
Loss (gain) on disposal of property and equipment	19	(18)
Accretion on investments	(22)	(4)
Other	(125)	—
Changes in operating assets and liabilities		
Accounts receivable	905	1,931
Inventory	(5,671)	(2,984)
Prepaid expenses and other current assets	1,952	(43)
Other long-term assets	84	(172)
Accounts payable	(1,122)	(1,894)
Accrued expenses and other current liabilities	(4,482)	1,373
Deferred revenue	613	(56)
Deferred rent, long term	—	(62)
Net cash used in operating activities	(31,787)	(22,768)
Cash flows from investing activities:		
Purchases of property and equipment	(4,342)	(792)
Proceeds from sale of property and equipment	—	20
Purchases of investments	(117,993)	—
Maturity of investments	25,000	15,000
Net cash (used) provided by investing activities	(97,335)	14,228
Cash flows from financing activities:		
Proceeds from issuance of redeemable convertible preferred stock, net of issuance costs	—	79,743
Proceeds from issuance of Class A common stock upon stock option exercise	471	287
Proceeds from issuance of restricted Class A stock award	—	523
Payments on finance lease obligations	(16)	—
Payments of deferred offering costs	—	(1,861)
Net cash provided by financing activities	455	78,692
Net (decrease) increase in cash, cash equivalents and restricted cash	(128,667)	70,152
Cash, cash equivalents and restricted cash at beginning of period	178,671	30,179
Cash, cash equivalents and restricted cash at end of period	$ 50,004	$ 100,331

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

RAPID MICRO BIOSYSTEMS, INC.
Condensed consolidated statements of cash flows, continued
(Unaudited)
(In thousands)

	Six Months Ended June 30,	
	2022	2021
Supplemental disclosure of cash flow information		
Cash paid for interest	$ 21	$ 1,098
Supplemental disclosure of non-cash investing activities		
Establishment of right of use operating assets	$ 7,605	$ —
Purchases of property and equipment in accounts payable	$ 380	$ 110
Supplemental disclosure of non-cash financing activities		
Establishment of right of use finance assets	$ 366	$ —
Deferred offering costs included in accounts payable and accrued expenses	$ —	$ 780
Accretion of redeemable convertible preferred stock to redemption value	$ —	$ 1,971
Cumulative redeemable convertible preferred stock dividends	$ —	$ 2,296

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

RAPID MICRO BIOSYSTEMS, INC.
Notes to condensed consolidated financial statements
(Amounts in thousands, except share and per share amounts)
(Unaudited)

1. Nature of the business and basis of presentation

Rapid Micro Biosystems, Inc. (the "Company") was incorporated under the laws of the State of Delaware on December 29, 2006. The Company develops, manufactures, markets and sells Growth Direct systems ("Systems") proprietary consumables, laboratory information management system ("LIMS") connection software, and services to address rapid microbial analysis used for quality control in the manufacture of pharmaceuticals, medical devices and personal care products. The Company's technology uses a highly sensitive camera and the natural auto fluorescence of living cells to identify and quantify microbial growth faster and more accurately than the traditional method, which relies on the human eye. The Company currently sells to customers in North America, Europe and Asia. The Company is headquartered in Lowell, Massachusetts.

In March 2020, the World Health Organization declared the global novel coronavirus disease 2019 ("COVID-19") outbreak a pandemic. The impact of this pandemic has been and may continue to be extensive in many aspects of society, which has resulted in and may continue to result in significant disruptions to the global economy, as well as businesses and capital markets around the world. The Company cannot at this time predict the ultimate extent, duration, or full impact that the COVID-19 pandemic will have on its future financial condition and operations. The impact of the ongoing COVID-19 pandemic on the Company's financial performance will depend on future developments, including the duration and spread of the pandemic and related governmental advisories and restrictions. These developments and the impact of COVID-19, and its variants, on the financial markets and the overall economy are highly uncertain and cannot be predicted. If the financial markets and/or the overall economy are impacted for an extended period, the Company's results may be materially adversely affected.

Future impacts to the Company's business as a result of COVID-19, and its variants, could include disruptions to the Company's manufacturing operations and supply chain caused by facility closures, reductions in operating hours, staggered shifts and other social distancing efforts; labor shortages; decreased productivity and unavailability of materials or components; limitations on its employees' and customers' ability to travel, and delays in shipments to and from affected countries and within the United States. While the Company maintains an inventory of finished products and raw materials used in its products, the effects of the ongoing COVID-19 pandemic could still lead to shortages in the raw materials necessary to manufacture its products.

Basis of presentation

These condensed consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States of America ("GAAP") and include the accounts of the Company and its wholly owned subsidiaries in Germany and Switzerland. All intercompany accounts and transactions have been eliminated in consolidation. Certain information and note disclosures normally included in the consolidated financial statements prepared in accordance with GAAP have been condensed or omitted. Therefore, these condensed consolidated financial statements should be read in conjunction with the consolidated financial statements and notes included in the Company's audited consolidated financial statements for the year ended December 31, 2021. Any reference in these notes to applicable guidance is meant to refer to the authoritative GAAP as found in the Accounting Standards Codification ("ASC") and Accounting Standards Update ("ASU") of the Financial Accounting Standards Board ("FASB").

The unaudited interim condensed consolidated financial statements have been prepared on the same basis as the audited annual consolidated financial statements and, in the opinion of management, reflect all adjustments, which include only normal recurring adjustments, necessary for the fair statement of the Company's financial position as of June 30, 2022 and the results of its operations and its cash flows for the three and six months ended June 30, 2022 and 2021. The financial data and other information disclosed in these notes related to the three and six months ended

June 30, 2022 and 2021 are also unaudited. The results for the three and six months ended June 30, 2022 are not necessarily indicative of results to be expected for the year ending December 31, 2022, any other interim periods, or any future year or period.

Reverse split

On July 9, 2021, the Company effected a one-for-five reverse stock split of its issued and outstanding shares of common stock and a proportional adjustment to the existing conversion ratios for each series of the Company's Preferred Stock (see Note 10). Accordingly, all share and per share amounts for all periods presented in the accompanying consolidated financial statements and notes thereto have been adjusted retroactively, where applicable, to reflect this reverse stock split and adjustment of the Preferred Stock conversion ratios.

Initial public offering

On July 19, 2021, the Company closed an initial public offering ("IPO") of its Class A common stock, which resulted in the sale of 7,920,000 shares of its Class A common stock at the initial public offering price of $20.00 per share, before underwriting discounts. The offering resulted in gross proceeds of $158.4 million and net proceeds to the Company of $143.8 million from the IPO after deducting underwriting discounts, commissions and offering expenses payable by the Company.

On August 4, 2021, the underwriters exercised their overallotment option in part and purchased 1,086,604 shares of Class A common stock at the initial public offering price of $20.00 per share less underwriting discounts and commissions. The overallotment option exercise resulted in net proceeds of $20.2 million.

Liquidity

The Company has incurred recurring losses and net cash outflows from operations since its inception. The Company expects to continue to generate significant operating losses for the foreseeable future. The Company expects that its existing cash and cash equivalents and investments will be sufficient to fund its operating expenses and capital expenditure requirements for at least twelve months following the date these unaudited interim condensed consolidated financial statements were issued.

2. Summary of significant accounting policies

Use of estimates

The preparation of the Company's condensed consolidated 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 condensed consolidated financial statements, and the reported amounts of revenue and expenses during the reporting periods. Significant estimates and assumptions reflected in these condensed consolidated financial statements include, but are not limited to, calculating the standalone selling price for revenue recognition, the valuation of inventory, the valuation of common stock and stock-based awards, and the valuation of the preferred stock warrant liability. The Company bases its estimates on historical experience, known trends and other market-specific and relevant factors that it believes to be reasonable under the circumstances. On an ongoing basis, management evaluates its estimates when there are changes in circumstances, facts and experience. Changes in estimates are recorded in the period in which they become known. Actual results could differ from those estimates.

Due to the COVID-19 pandemic, there has been uncertainty and disruption in the global economy and financial markets. The Company is not aware of any specific event or circumstance that would require an update to its estimates or judgments or a revision of the carrying value of its assets or liabilities. These estimates may change as new events occur and additional information is obtained.

Other than policies noted below, there have been no significant changes to the significant accounting policies during the three and six months ended June 30, 2022, as compared to the significant accounting policies disclosed in Note 2 of the audited consolidated financial statements as of December 31, 2021 filed with the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2021.

Risk of concentrations of credit, significant customers and significant suppliers

Financial instruments that potentially expose the Company to concentrations of credit risk consist primarily of cash and cash equivalents, short-term and long-term investments and accounts receivable. Periodically, the Company maintains deposits in accredited financial institutions in excess of federally insured limits. The Company maintains its cash and cash equivalents and investments with financial institutions that management believes to be of high credit quality. The Company has not experienced any other-than-temporary losses with respect to its cash equivalents and investments and does not believe that it is subject to unusual credit risk beyond the normal credit risk associated with commercial banking relationships.

Significant customers are those which represent more than 10% of the Company's total revenue or accounts receivable balance at each respective balance sheet date. The following table presents customers that represent 10% or more of the Company's total revenue:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Customer A	28.3 %	*	21.7 %	*
Customer B	15.0 %	*	*	*
Customer C	14.0 %	*	*	*
Customer D	*	*	*	13.7 %
Customer E	*	15.9 %	*	*
	57.3 %	15.9 %	21.7 %	13.7 %

* – less than 10%

The following table presents customers that represent 10% or more of the Company's accounts receivable:

	June 30,	December 31,
	2022	2021
Customer A	20.4 %	19.5 %
Customer B	15.9 %	12.6 %
Customer C	14.1 %	*
Customer F	12.7 %	*
Customer G	*	10.6 %
Customer H	*	10.0 %
	63.1 %	52.7 %

* – less than 10%

The Company relies on third parties for the supply and manufacture of certain components of its products as well as third-party logistics providers. There are no significant concentrations around a single third-party supplier or manufacturer for the three and six months ended June 30, 2022 or 2021.

Debt issuance costs

The Company capitalizes certain legal and other third-party fees that are directly associated with the issuance of debt as debt issuance costs. Debt issuance costs are recorded as a direct reduction of the carrying amount of the associated debt on the condensed consolidated balance sheets and amortized as interest expense on the condensed consolidated statements of operations using the effective interest method, which approximates the straight-line method.

As of June 30, 2022 and December 31, 2021, the Company had no debt issuance costs on its condensed consolidated balance sheets. During the three months ended June 30, 2022 and 2021, the Company recorded zero and $0.1 million, respectively, and during the six months ended June 30, 2022 and 2021, the Company recorded zero and $0.2 million, respectively, of interest expense related to amortization of debt issuance costs in the condensed consolidated statements of operations.

Cash equivalents

The Company considers all highly liquid investments with an original maturity of 90 days or less at the time of purchase to be cash equivalents. Cash equivalents that are readily convertible to cash are stated at cost, which approximates fair value. At June 30, 2022 and December 31, 2021, the Company held cash of $0.3 million in banks located outside of the United States.

Restricted cash

As of June 30, 2022 and December 31, 2021, the Company was required to maintain guaranteed investment certificates of $0.3 million with maturities of three months to one year that are subject to an insignificant risk of changes in value. The guaranteed investment certificates are held for the benefit of the landlord in connection with an operating lease which has a remaining term of greater than one year and are classified as restricted cash (non-current) on the Company's consolidated balance sheets.

Software Development Costs

The Company accounts for software development costs for internal-use software under the provisions of ASC 350-40, *"Internal-Use Software*" ("ASC 350"). Accordingly, certain costs to develop internal-use computer software are capitalized, provided these costs are expected to be recoverable. There was $1.2 million of software development costs, net of amortization, capitalized in other long-term assets at June 30, 2022. The capitalized costs are being amortized on a straight-line basis over the initial subscription term of five years. For the three months ended June 30, 2022 and 2021, there was $0.1 million and zero, respectively, and for the six months ended June 30, 2022 and 2021, there was $0.2 million and zero, respectively, of amortization expense recorded in the condensed consolidated statements of operations.

Fair value measurements

Certain assets and liabilities of the Company 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 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, short-term and long-term 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 receivable, prepaid expenses and other current assets, accounts payable and accrued expenses and other current liabilities approximate their fair values due to the short-term nature of these assets and liabilities.

Product warranties

The Company offers a one-year limited assurance warranty on System sales, which is included in the selling price. The warranty accrual is included in accrued expenses and other current liabilities in the condensed consolidated balance sheets. The following table presents a summary of changes in the amount reserved for warranty cost (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Balance, beginning of period	$ 595	$ 618	$ 598	$ 637
Warranty provisions	341	—	351	—
Warranty repairs	—	(6)	(13)	(25)
Balance, end of period	$ 936	$ 612	$ 936	$ 612

Segment information

The Company determined its operating segment after considering the Company's organizational structure and the information regularly reviewed and evaluated by the Company's chief operating decision maker ("CODM") in deciding how to allocate resources and assess performance. The Company has determined that its CODM is its Chief Executive Officer. The CODM reviews the financial information on a consolidated basis for purposes of evaluating financial performance and allocating resources. On the basis of these factors, the Company determined that it operates and manages its business as one operating segment, that develops, manufactures, markets and sells Systems and related LIMS connection software, consumables and services; and accordingly has one reportable segment for financial reporting purposes. Substantially all of the Company's long-lived assets are held in the United States.

Revenue recognition

Remaining performance obligations

The Company does not disclose the value of remaining performance obligations for (i) contracts with an original contract term of one year or less, (ii) contracts for which the Company recognizes revenue at the amount to which it has the right to invoice when that amount corresponds directly with the value of services performed, and (iii) variable consideration allocated entirely to a wholly unsatisfied performance obligation or to a wholly unsatisfied distinct service that forms part of a single performance obligation. The Company does not have material remaining performance obligations associated with contracts with terms greater than one year.

Contract balances from contracts with customers

Contract assets arise from unbilled amounts in customer arrangements when revenue recognized exceeds the amount billed to the customer and the Company's right to payment is conditional and not only subject to the passage of time. The Company had $0.1 million and $0.3 million in contract assets as of June 30, 2022 and December 31, 2021, respectively, included in prepaid expenses and other current assets. These balances relate to unbilled amounts with commercial customers, as well as amounts due under the BARDA (as defined below) agreements.

Contract liabilities represent the Company's obligation to transfer goods or services to a customer for which it has received consideration (or the amount is due) from the customer. The Company has a contract liability related to service revenue, which consists of amounts that have been invoiced but that have not been recognized as revenue. Amounts expected to be recognized as revenue within 12 months of the balance sheet date are classified as current deferred revenue and amounts expected to be recognized as revenue beyond 12 months of the balance sheet date are classified as noncurrent deferred revenue. The Company did not record any non-current deferred revenue as of June 30, 2022 or December 31, 2021. Deferred revenue was $3.9 million and $3.3 million at June 30, 2022 and

December 31, 2021, respectively. Revenue recognized during the three months ended June 30, 2022 and 2021 that was included in deferred revenue at the prior period-end was $0.8 million and $1.6 million, respectively. Revenue recognized during the six months ended June 30, 2022 and 2021 that was included in deferred revenue at the prior period-end was $1.9 million and $2.8 million, respectively.

Non-commercial revenue

The Company has historically generated revenue from a long-term contract with the U.S. Department of Health and Human Services Biomedical Advanced Research and Development Authority ("BARDA") a part of the U.S. government. The Company's contracts with the U.S. government typically are subject to the Federal Acquisition Regulation ("FAR") and are priced based on estimated or actual costs of producing goods or providing services. The FAR provides guidance on the types of costs that are allowable in establishing prices for goods or services provided under U.S. government contracts. In September 2017, the Company signed a contract with BARDA, which was subsequently modified on multiple occasions to increase the contract value and adjust the cost share reimbursement rate. Modifications were accounted for in accordance with the contract modification framework. The contract is a cost-reimbursable, cost- sharing arrangement, whereby BARDA reimburses the Company for a percentage of the total costs that have been incurred including indirect allowable costs. All funding under this contract was fully earned by the fourth quarter of 2021.

Disaggregated revenue

The Company disaggregates revenue based on the recurring and non-recurring, and commercial and non-commercial, nature of the underlying sale. Recurring revenue includes sales of consumables and service contracts. Non-recurring revenue includes sales of Systems, LIMS connection software, validation services, field service, and revenue under the Company's contract with BARDA. The following table presents the Company's revenue by the recurring or non-recurring and commercial or non-commercial nature of the revenue stream (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Product and service revenue — recurring	$ 2,500	$ 1,904	$ 5,158	$ 3,368
Product and service revenue — non-recurring	1,360	3,790	2,862	7,111
Non-commercial revenue — non-recurring	—	436	—	646
Total revenue	$ 3,860	$ 6,130	$ 8,020	$ 11,125

The following table presents the Company's revenue by customer geography (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
United States	$ 2,319	$ 3,446	$ 4,361	$ 5,773
Germany	401	636	825	965
Switzerland	609	1,048	1,488	2,090
All other countries	531	1,000	1,346	2,297
Total revenue	$ 3,860	$ 6,130	$ 8,020	$ 11,125

Advertising costs

Advertising costs are expensed as incurred and are included in sales and marketing expenses in the condensed consolidated statements of operations. Advertising costs were less than $0.1 million during the three and six months ended June 30, 2022 and 2021.

Stock-based compensation

The Company measures all stock-based awards granted to employees, officers and directors based on their fair value on the date of the grant and recognizes compensation expense for those awards over the requisite service period, which is generally the vesting period of the respective award. The Company issues stock-based awards with only service-based vesting conditions and records the expense for these awards using the straight-line method. Forfeitures are accounted for prospectively as they occur.

The Company measures all restricted common stock and restricted stock units granted to employees based on the common stock value on the date of grant. The purchase price of the restricted common stock is the common stock value on the date of grant. The restricted common stock includes a repurchase right, whereas upon the occurrence of a specific event, the Company shall have the right to repurchase unvested restricted common stock shares. At June 30, 2022 and December 31, 2021, the Company had \$0.3 million and \$0.5 million, respectively, in unvested restricted Class A common stock liability included in other long-term liabilities.

Comprehensive loss

Comprehensive loss includes net loss as well as other changes in stockholders' equity that result from transactions and economic events other than those with stockholders. For the three months ended June 30, 2022 and 2021, there were \$0.3 million and less than \$0.1 million, respectively, and for the six months ended June 30, 2022 and 2021, there were \$0.9 million and less than \$0.1 million, respectively, of unrealized losses on short-term and long-term investments, net of tax.

Recently adopted accounting pronouncements

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)* to increase transparency and comparability among organizations related to their leasing arrangements. The update requires lessees to recognize most leases, with the exception of short-term leases if a policy election is made, on their balance sheets as a right-of-use (ROU) asset representing the right to use an underlying asset and a lease liability representing the obligation to make lease payments over the lease term, measured on a discounted basis, while recognizing lease expense on their income statements in a manner similar to current GAAP. The guidance also requires entities to disclose key quantitative and qualitative information about its leasing arrangements.

The Company leases office and manufacturing space under operating lease agreements. The Company leases furniture under a financing agreement. The Company adopted Topic 842 on January 1, 2022 using the optional transition method to the modified retrospective approach. Under this transition provision, results for reporting periods beginning on January 1, 2022 are presented under Topic 842 while prior period amounts continue to be reported and disclosed in accordance with the Company's historical accounting treatment under ASC Topic 840, *Leases* ("ASC 840").

The Company elected the "package of practical expedients" permitted under the transition guidance, which among other things, does not require reassessment of whether contracts entered into prior to adoption are or contain leases, and allows carryforward of the historical lease classification for existing leases. The Company did not elect the "hindsight" practical expedient, and therefore measured the ROU assets and lease liabilities using the remaining portion of the lease term at adoption on January 1, 2022.

The Company made an accounting policy election not to recognize ROU assets and lease liabilities for leases with a term of twelve months or less. For all other leases, the Company recognizes ROU assets and lease liabilities based on the present value of lease payments over the lease term at the commencement date of the lease (or January 1, 2022 for existing leases upon the adoption of ASC 842). Lease payments may include fixed rent escalation clauses or payments that depend on an index (such as the consumer price index). Subsequent changes to an index and any other periodic market-rate adjustments to base rent are recorded in variable lease expense in the period incurred. The ROU assets also include any initial direct costs incurred and lease payments made at or before the commencement date and are reduced by any lease incentives.

The Company has made an accounting policy election to account for lease and non-lease components in its contracts as single lease components for all asset classes. The non-lease components typically represent additional services transferred to the Company, such as common area maintenance for real estate, which are variable in nature and recorded in variable lease expense in the period incurred.

The Company uses its incremental borrowing rate which is the rate of interest the Company would have to pay to borrow on a collateralized basis over a similar term and amount in a similar economic environment to determine the present value of lease payments as the Company's leases do not have a readily determinable implicit discount rate. Judgment is applied in assessing factors such as Company specific credit risk, lease term, nature, and quality of the underlying collateral, currency, and economic environment in determining the incremental borrowing rate to apply to each lease.

Upon adoption, the Company recorded operating lease ROU assets and lease liabilities of $6.0 million and $7.0 million, respectively, the difference relating to deferred rent. The Company recorded financing lease ROU assets and lease liabilities of approximately $0.4 million. The adoption of the new lease standard on January 1, 2022 did not materially impact our condensed consolidated statements of operations, comprehensive loss or cash flows.

In December 2019, the FASB issued ASU 2019-12, *Income Taxes (ASC 740): Simplifying the Accounting for Income Taxes* ("ASU 2019-12"), which is intended to simplify various areas related to accounting for income taxes. ASU 2019-12 removes certain exceptions to the general principles in ASC 740 and also clarifies and amends existing guidance to improve consistent application. The Company adopted this guidance effective January 1, 2022, and the adoption had no material impact on its condensed consolidated financial statements and related disclosures.

Recently issued accounting pronouncements

The Company qualifies as an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012 and has elected not to "opt out" of the extended transition related to complying with new or revised accounting standards, which means that when a standard is issued or revised and it has different application dates for public and nonpublic companies, the Company will adopt the newer revised standard at the time nonpublic companies adopt the new or revised standard and will do so until such time that the Company either (i) irrevocably elects to "opt out" of such extended transition period or (ii) no longer qualifies as an emerging growth company. The Company may choose to early adopt any new or revised accounting standards whenever such early adoption is permitted for nonpublic companies.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments — Credit Losses (Topic 326)* ("ASU 2016- 13"). The new standard adjusts the accounting for assets held at amortized costs basis, including marketable securities accounted for as available for sale, and trade receivables. The standard eliminates the probable initial recognition threshold and requires an entity to reflect its current estimate of all expected credit losses. The allowance for credit losses is a valuation account that is deducted from the amortized cost basis of the financial assets to present the net amount expected to be collected. The Company expects to adopt this guidance effective January 1, 2023, and it is currently evaluating the impact on its condensed consolidated financial statements and related disclosures.

3. Fair value of financial assets and liabilities

The following tables present information about the Company's financial assets and liabilities measured at fair value on a recurring basis and indicate the level of the fair value hierarchy used to determine such fair values (in thousands):

	Fair value measurements as of June 30, 2022			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$ 45,132	$ —	$ —	$ 45,132
Short-term investments	94,371	—	—	94,371
Long-term investments	22,816	—	—	22,816
	$ 162,319	$ —	$ —	$ 162,319

	Fair value measurements at December 31, 2021			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$ 173,755	$ —	$ —	$ 173,755
Short-term investments	15,110	—	—	15,110
Long-term investments	9,966	—	—	9,966
	$ 198,831	$ —	$ —	$ 198,831

During the three and six months ended June 30, 2022 and 2021, respectively, there were no transfers between Level 1, Level 2 and Level 3.

Valuation of short-term and long-term investments

Short-term and long-term investments, which consisted of U.S. Treasury bonds and notes and certificates of deposit were valued by the Company using quoted prices in active markets for similar securities, which represents a Level 1 measurement within the fair value hierarchy.

4. Investments

Short-term and long-term investments by investment type consisted of the following (in thousands):

	June 30, 2022			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Short-term investments				
U.S. Government Treasury Bills	$ 47,371	$ —	$ (137)	$ 47,234
U.S. Government Treasury Notes	47,595	—	(458)	47,137
	$ 94,966	$ —	$ (595)	$ 94,371
Long-term Investments				
Certificates of Deposit	1,169	—	(5)	1,164
U.S. Government Treasury Notes - Maturity One - Two Years	21,971	16	(335)	21,652
	$ 23,140	$ 16	$ (340)	$ 22,816

	December 31, 2021			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Short-term investments				
U.S. Government Treasury Bills	$ 4,983	$ —	$ (2)	$ 4,981
U.S. Government Treasury Notes	10,142	—	(13)	10,129
	$ 15,125	$ —	$ (15)	$ 15,110
Long-term Investments				
U.S. Government Treasury Notes - Maturity One - Five Years	$ 9,966	$ —	$ —	$ 9,966
	$ 9,966	$ —	$ —	$ 9,966

5. Inventory

Inventory consisted of the following (in thousands):

	June 30, 2022	December 31, 2021
Raw materials	$ 12,559	$ 10,135
Work in process	722	1,235
Finished goods	8,012	4,301
Total	$ 21,293	$ 15,671

Raw materials, work in process and finished goods were net of adjustments to net realizable value of $0.6 million and $1.2 million as of June 30, 2022 and December 31, 2021, respectively.

6. Prepaid expenses and other current assets

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

	June 30, 2022	December 31, 2021
Prepaid insurance	$ 131	$ 1,622
Contract asset	123	396
Deposits	1,009	1,262
Lease receivables, current portion	103	231
Other	633	440
	$ 1,999	$ 3,951

7. Property and equipment, net

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

	June 30, 2022	December 31, 2021
Manufacturing and laboratory equipment	$ 11,737	$ 13,277
Computer hardware and software	1,553	1,742
Office furniture and fixtures	580	745
Leasehold improvements	8,243	3,012
Construction-in-process	1,001	4,313
	23,114	23,089
Less: Accumulated depreciation	(10,465)	(11,785)
	$ 12,649	$ 11,304

Depreciation and amortization expense related to property and equipment was $0.6 million and $0.3 million for the three months ended June 30, 2022 and 2021, respectively. Depreciation and amortization expense related to property and equipment was $1.1 million and $0.7 million for the six months ended June 30, 2022 and 2021, respectively. The Company had $2.3 million and less than $0.1 million fully depreciated assets disposed of during the three months ended June 30, 2022 and 2021, respectively, and $2.3 million and less than $0.1 million fully depreciated assets disposed of during the six months ended June 30, 2022 and 2021, respectively.

8. Accrued expenses and other current liabilities

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

	June 30, 2022	December 31, 2021
Accrued employee compensation and benefits expense	$ 2,321	$ 3,569
Accrued vendor expenses	1,588	5,500
Accrued warranty expense	935	598
Deferred rent, current portion	—	131
Accrued taxes	237	781
Other	200	338
	$ 5,281	$ 10,917

9. Long-term debt

There was no long-term debt outstanding as of June 30, 2022 or December 31, 2021.

Term loan agreements

2020 Term Loan

In May 2020, the Company entered into a $60.0 million term loan facility with a new lender (the “2020 Term Loan”), which provides for borrowings of an initial $25.0 million tranche upon closing and options to borrow up to an aggregate of $35.0 million in two additional tranches of $20.0 million under the second tranche (the “Term B Loan”) and $15.0 million under the third tranche (the “Term C Loan”).

At closing, the Company issued warrants to purchase 1,195,652 shares of Series C1 Preferred Stock to the lender with an exercise price of $1.15 per share which were accounted for as debt discount. The Company paid a $0.8 million facility fee in connection with the term loan facility. The Company allocated the $0.8 million term loan facility fee to the three loan tranches on a pro-rata basis based on the amount available to be drawn down under each tranche. The Company allocated $0.3 million to the initial draw which was recorded within debt issuance cost as an offset to the carrying value of the 2020 Term Loan and amortized over the term of the loan within interest expense on the condensed consolidated statement of operations. Additionally, the Company allocated $0.3 million to the Term B Loan and $0.2 million to the Term C Loan, all of which was recorded within prepaid expenses and other current assets on the consolidated balance sheet and is being amortized on a straight-line basis over the debt access period within interest expense on the consolidated statement of operations.

The Company incurred debt issuance costs of $1.5 million in connection with the 2020 Term Loan including $0.9 million of professional fees and $0.6 million for the fair value of the warrants issued with the debt. Interest expense on the 2020 Term Loan totaled $0.9 million and $1.8 million for three and six months ended June 30, 2021, respectively, which included amortization of the debt discount of $0.1 million and $0.3 million for the three and six months ended June 30, 2021, respectively.

In September 2021, the Company repaid the 2020 Term Loan and incurred a debt extinguishment loss of $3.1 million, which was comprised of a $1.8 million prepayment penalty, $1.1 million expense related to unamortized discounts, and $0.2 million in unamortized prepaid facility fees and other charges.

10. Redeemable convertible preferred stock

The Company has historically issued Series A1 redeemable convertible preferred stock (the “Series A1 Preferred Stock”), Series B1 redeemable convertible preferred stock (the “Series B1 Preferred Stock”), Series C1 redeemable convertible preferred stock (the “Series C1 Preferred Stock”), Series C2 redeemable convertible preferred stock (the “Series C2 Preferred Stock”), Series D1 redeemable convertible preferred stock (the “Series D1 Preferred

Stock”) and Series D2 redeemable convertible preferred stock (the “Series D2 Preferred Stock”). The Series A1 Preferred Stock, Series B1 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock, Series D1 Preferred Stock, and Series D2 Preferred Stock are collectively referred to as the “Preferred Stock”.

In March 2021, the Company issued and sold 22,086,725 shares of Series D1 Preferred Stock and 413,268 shares of Series D2 Preferred Stock to new and existing investors at a price of $3.60 per share for gross proceeds of $79.5 million and $1.5 million, respectively. The Company incurred issuance costs in connection with this transaction of $1.3 million and recorded them as a reduction to the carrying value of the Series D1 Preferred Stock and Series D2 Preferred Stock.

On June 25, 2021, investors exchanged a total of 11,437,301 shares and 2,364,509 shares of Series C1 and D1 Preferred Stock to an equal number of shares of Series C2 and D2 Preferred Stock, respectively.

On July 14, 2021, the IPO resulted in the automatic conversion of all Series A1, Series B1, Series C1 and Series D1 preferred stock into 24,200,920 shares of Class A common stock and of all Series C2 and Series D2 preferred stock into 6,903,379 shares of Class B common stock. On July 19, 2021, the Company restated its certificate of incorporation and authorized 10,000,000 shares of $0.01 par value Preferred Stock.

11. Preferred stock warrants

In connection with the 2020 Term Loan, the Company issued 1,195,652 warrants to purchase shares of Series C1 Preferred Stock at an exercise price of $1.15 per share. The Company’s warrants were immediately exercisable and expire 10 years after issuance. The fair value of the warrants on the issuance date was $0.7 million. The Company also had outstanding warrants to purchase shares of Preferred Stock issued in connection with previous financing agreements.

In connection with the IPO, all of the Company’s outstanding preferred stock warrants were automatically converted to Class A common stock warrants. The Company determined the conversion to Class A common stock warrants resulted in equity classification of the Class A common stock warrants and reclassified the fair value of the preferred stock warrant liability as of the IPO date into stockholders’ equity (see Note 12).

The warrant liability was related to the warrants to purchase shares of the Company’s Series A1, B1, and C1 redeemable convertible preferred stock (see Note 10). The fair value of the warrant liability was determined based on inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy.

The Company used the Black-Scholes option-pricing model, which incorporates assumptions and estimates, to value the warrant liability. Key estimates and assumptions impacting the fair value measurement include (i) the fair value per share of the underlying shares of applicable series of redeemable convertible preferred stock issuable upon exercise of the warrants, (ii) the remaining contractual term of the warrants, (iii) the risk-free interest rate, (iv) the expected dividend yield and (v) expected volatility of the price of the underlying applicable series of redeemable convertible preferred stock. The Company estimated the fair value per share of the underlying applicable series of redeemable convertible preferred stock based, in part, on the results of third-party valuations and additional factors deemed relevant. The risk-free interest rate was determined by reference to the U.S. Treasury yield curve for time periods approximately equal to the remaining contractual term of the warrant. The Company estimated a zero expected dividend yield based on the fact that the Company has never paid or declared dividends and does not intend to do so in the foreseeable future. As the Company has historically been a private company and lacks company-specific historical and implied volatility information of its stock, the expected stock volatility was based on the historical volatility of publicly traded peer companies for a term equal to the remaining contractual term of the warrant.

The table below quantifies the weighted average of the unobservable inputs used to fair value the preferred stock warrant liability as of June 30, 2021, prior to their conversion into common stock warrants:

	Three Months Ended June 30, 2021	Six Months Ended June 30, 2021
Fair value of Series A1 preferred stock	$ 2.51	$ 2.52
Fair value of Series B1 preferred stock	$ 2.88	$ 2.89
Fair value of Series C1 preferred stock	$ 2.95	$ 2.96
Remaining contractual term (in years)	6.7	6.8
Risk-free interest rate	1.1 %	1.2 %
Expected dividend yield	— %	— %
Expected volatility	42.2 %	41.9 %

The following table provides a rollforward of the aggregate fair values of the Company's preferred stock warrant liability, prior to their conversion into common stock warrants, for which fair values are determined using Level 3 inputs (in thousands):

	Three Months Ended June 30, 2021	Six Months Ended June 30, 2021
Balance, beginning of period	$ 15,565	$ 4,117
Change in fair value	35	11,483
Balance, end of period	$ 15,600	$ 15,600

There were no outstanding preferred stock warrants as of June 30, 2022 or December 31, 2021.

12. Common stock and common stock warrants

As of June 30, 2022 and December 31, 2021, the Company's restated certificate of incorporation authorized the issuance of 210,000,000 shares of $0.01 par value Class A common stock.

On June 25, 2021, the Company filed an amended and restated certificate of incorporation, which effected a recapitalization of the Company's then outstanding common stock to Class A common stock and authorized an additional new class of common stock (Class B common stock). Rights of the holders of Class A common stock and Class B common stock are identical, except with respect to voting and conversion. On July 19, 2021, the Company filed an amended and restated certificate of incorporation which authorized Class A common stock and Class B common stock to 210,000,000 shares and 10,000,000 shares, respectively. As of June 30, 2022, there were 36,389,073 shares of Class A common stock issued and outstanding, and 5,553,379 shares of Class B common stock issued and outstanding.

Each share of Class A common stock entitles the holder to one vote on all matters submitted to a vote of the Company's stockholders. The Company's Class B common stock is non-voting. Class A and Class B common stockholders are entitled to receive dividends, as may be declared by the board of directors, if any, subject to the preferential dividend rights of Preferred Stock. As of June 30, 2022, no cash dividends had been declared or paid.

As of June 30, 2022, the Company had reserved 20,268,510 shares of common stock for the exercise of outstanding stock options, vesting of restricted stock units, the number of shares remaining available for grant under the Company's 2021 Incentive Award Plan (see Note 13), the number of shares available for purchase under the Company's Employee Stock Purchase Plan (see Note 13), shares of common stock for the exercise of outstanding common stock warrants and the conversion of Class B common stock.

In prior years the Company issued warrants to purchase common stock in conjunction with previous financing arrangements. In connection with the IPO, all outstanding preferred stock warrants were automatically converted to Class A common stock warrants. The contractual terms of the converted Class A common stock warrants remained consistent with the original terms of the preferred stock warrants. The Company determined the event resulted in equity classification of the Class A common stock warrants and reclassified the fair value of the preferred stock warrant liability as of the IPO date into equity.

As of June 30, 2022, outstanding warrants to purchase common stock consisted of the following:

	June 30, 2022			
Issuance date	**Contractual term** (in years)	**Balance sheet classification**	**Shares of common stock issuable upon exercise of warrant**	**Weighted average exercise price**
July 24, 2017	10	Equity	17,194	$ 292.81
April 12, 2018	10	Equity	30,000	$ 1.00
July 14, 2021	10	Equity	975,109	$ 1.46
			1,022,303	

As of December 31, 2021, outstanding warrants to purchase common stock outstanding consisted of the following:

	December 31, 2021			
Issuance date	**Contractual term** (in years)	**Balance sheet classification**	**Shares of common stock issuable upon exercise of warrant**	**Weighted average exercise price**
July 24, 2017	10	Equity	25,835	$ 295.15
April 12, 2018	10	Equity	30,000	$ 1.00
July 14, 2021	10	Equity	975,109	$ 1.46
			1,030,944	

13. Stock-based compensation

2010 Stock Option and Grant Plan

The Company's 2010 Stock Option and Grant Plan (the "2010 Plan") provided for the Company to grant incentive stock options or nonqualified stock options, restricted stock awards and other stock-based awards to employees, officers, directors and consultants of the Company.

In March 2021, the Board of Directors approved an increase to the 2010 Plan shares by 382,889 shares. Following the effectiveness of the IPO, no additional awards are being granted under the 2010 Plan and shares of existing outstanding options that are forfeited or canceled will be available for grant under the 2021 Incentive Award Plan.

2021 Incentive Award Plan

In July 2021, the Board of Directors adopted, and the Company's stockholders approved, the 2021 Incentive Award Plan (the "2021 Plan"), which became effective in connection with the IPO of Class A common stock. The 2021 Plan provides for the grant of stock options, including incentive stock options and non-qualified stock options, stock appreciation rights, restricted stock, restricted stock units, and other stock-based and cash-based awards. The 2021 Plan has a term of ten years. The aggregate number of shares of Class A common stock available for issuance under the 2021 Plan is equal to (i) 4,200,000 shares; (ii) any shares which are subject to the 2010 Plan awards that become available for issuance under the 2021 Plan; and (iii) an annual increase for ten years on the first day of each calendar year beginning on January 1, 2022, equal to the lesser of (A) 5% of the aggregate number of shares of Class A common stock outstanding on the last day of the immediately preceding calendar year and (B) such smaller amount of shares as determined by the Board of Directors. No more than 33,900,000 shares of Class A common stock may be issued under the 2021 Plan upon the exercise of incentive stock options. As of June 30, 2022, there are 3,593,599 shares available for issuance under the 2021 Plan.

The following table presents, on a weighted average basis, the assumptions used in the Black-Scholes option-pricing model to determine the grant-date fair value of stock options granted to employees and directors:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Risk-free interest rate	2.85 %	1.1 %	2.00 %	1.0 %
Expected term (in years)	5.9	6.1	6.0	6.0
Expected volatility	43.9 %	43.1 %	43.1 %	44.3 %
Expected dividend yield	0 %	0 %	0 %	0 %

Stock options

The following table summarizes the Company's stock option activity since December 31, 2021:

	Number of shares	Weighted average exercise price	Weighted average remaining contractual term	Aggregate intrinsic value
			(in years)	(in thousands)
Outstanding as of December 31, 2021	4,823,100	$ 5.06	7.62	$ 31,041
Granted	1,542,759	7.53		
Exercised	(475,033)	0.99		
Expired	(5,546)	10.74		
Forfeited	(212,152)	11.85		
Outstanding as of June 30, 2022	5,673,128	$ 5.79	8.15	$ 9,010
Options vested and expected to vest as of June 30, 2022	5,673,128	$ 5.79	8.15	$ 9,010
Options exercisable as of June 30, 2022	2,426,101	$ 2.72	6.78	$ 6,687

The aggregate intrinsic value of options is calculated as the difference between the exercise price of the stock options and the fair value of the Company's Class A common stock for those options that had exercise prices lower than such fair value.

The intrinsic value of stock options exercised during the six months ended June 30, 2022 and 2021 was $2.8 million and $0.3 million, respectively.

The weighted average grant-date fair value per share of stock options granted during the three months ended June 30, 2022 and 2021 was $2.40 and $1.03, respectively, and during the six months ended June 30, 2022 and 2021 was $3.30 and $0.80, respectively.

Restricted stock

In February 2021, the Company granted 248,903 shares of restricted stock to an employee under the 2010 Plan with a four-year vesting term. In connection with the grant, the employee paid $0.5 million, which represents the $2.10 per share fair value of the common stock on the date of the restricted stock grant. The restricted common stock includes a repurchase right, whereas upon the occurrence of the employee's resignation or termination for cause or good reason the Company shall have the right to repurchase unvested restricted common stock shares. At June 30, 2022 and December 31, 2021, the Company had $0.3 million and $0.5 million in unvested restricted common stock liability included in other long-term liabilities, respectively.

The following table summarizes the Company's restricted stock activity since December 31, 2021:

	Number of shares	Weighted average fair value
Unvested as of December 31, 2021	248,903	$ 2.10
Granted	-	-
Vested	(82,967)	$ 2.10
Forfeited	-	-
Unvested as of June 30, 2022	165,936	$ 2.10

Restricted stock units

Restricted stock unit grants to employees have a three-year vesting term. The Company expenses the fair value of the restricted stock units over the vesting period and accounts for forfeitures prospectively as they occur. The following table summarizes restricted stock units granted to Company employees during the six months ended June 30, 2022:

	Number of shares	Weighted average fair value
Unvested as of December 31, 2021	-	$ -
Granted	593,480	7.62
Vested	-	-
Forfeited	(9,600)	7.58
Unvested as of June 30, 2022	583,880	$ 7.62

The weighted average grant-date fair value per share of restricted stock units granted during the three and six months ended June 30, 2022 was $5.00 and $7.62, respectively. There were no restricted stock units granted during the six months ended June 30, 2021.

2021 Employee Stock Purchase Plan

In July 2021, the Board of Directors adopted, and the Company's stockholders approved, the 2021 Employee Stock Purchase Plan (the "2021 ESPP"), which became effective in connection with the IPO of Class A common stock. The aggregate number of shares of Class A common stock available for issuance under the 2021 ESPP is equal to (i) 400,000 shares and (ii) an annual increase for ten years on the first day of each calendar year beginning on January 1, 2022, equal to the lesser of (A) 1% of the aggregate number of shares of Class A common stock outstanding on the last day of the immediately preceding calendar year and (B) such smaller amount of shares as determined by the Board of Directors. No more than 6,300,000 shares of Class A common stock may be issued under the 2021 ESPP.

Under the 2021 ESPP, eligible employees may purchase shares of the Company's common stock through payroll deductions of up to 15% of eligible compensation during an offering period. Generally, each offering period will be for 6 months as determined by the Company's board of directors. In no event may an employee purchase more than 100,000 shares per offering period based on the closing price on the first trading date of an offering period or the last trading date of an offering period, or more than $25,000 worth of stock during any calendar year. The purchase price for shares to be purchased under the 2021 ESPP is 85% of the lesser of the market price of the Company's common stock on the first trading date of an offering period or on any purchase date during an offering period (March 14 or September 14).

During the six months ended June 30, 2022, there were no shares of Class A common stock purchased under the 2021 ESPP. The Company recognized less than $0.1 million of expense related to the 2021 ESPP for each of the three and six months ended June 30, 2022. As of June 30, 2022, 745,640 shares were available under the 2021 ESPP for future issuance.

The Company estimates the fair value of shares issued to employees under the 2021 ESPP using the Black-Scholes option-pricing model. The following weighted average assumptions were used in the calculation of fair value of shares under the 2021 ESPP at the grant date for the three and six months ended June 30, 2022 (there were no offering periods for the three and six months ended June 30, 2021):

	Three Months Ended June 30, 2022	Six Months Ended June 30, 2022
Risk-free interest rate	0.86 %	0.86 %
Expected term (in years)	0.5	0.5
Expected volatility	43.1 %	43.1 %
Expected dividend yield	0 %	0 %

Stock-based compensation

Stock-based compensation expense was classified in the condensed consolidated statements of operations as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Cost of revenue	$ 164	$ 85	$ 264	$ 115
Research and development	100	37	179	49
Sales and marketing	142	60	276	82
General and administrative	852	208	1,522	335
Total stock-based compensation expense	$ 1,258	$ 390	$ 2,241	$ 581

As of June 30, 2022, total unrecognized compensation expense related to unvested stock options held by employees and directors was $10.8 million, which is expected to be recognized over a weighted average period of 2.9 years. Additionally, unrecognized compensation expense related to unvested restricted stock units held by employees and directors was $3.9 million, which is expected to be recognized over a weighted average period of 2.7 years.

14. Income taxes

During the three and six months ended June 30, 2022 and 2021, the pretax losses incurred by the Company, as well as the research and development tax credits generated, received no corresponding tax benefit because the Company concluded that it is more likely than not that the Company will be unable to realize the value of any resulting deferred tax assets. The Company will continue to assess its position in future periods to determine if it is appropriate to reduce a portion of its valuation allowance in the future.

The Company's tax provision and the resulting effective tax rate for interim periods is determined based upon its estimated annual effective tax rate, adjusted for the effect of discrete items arising in that quarter.

The impact of such inclusions could result in a higher or lower effective tax rate during a particular quarter, based upon the mix and timing of actual earnings or losses versus annual projections. In each quarter, the Company updates its estimate of the annual effective tax rate, and if the estimated annual tax rate changes, a cumulative adjustment is made in that quarter.

The Company has evaluated the positive and negative evidence bearing upon its ability to realize its deferred tax assets, which primarily consist of net operating loss carryforwards. The Company has considered its history of cumulative net losses, estimated future taxable income and prudent and feasible tax planning strategies and has concluded that it is more likely than not that the Company will not realize the benefits of its deferred tax assets. As a result, as of June 30, 2022 and December 31, 2021 the Company has recorded a full valuation allowance against its net deferred tax assets.

The Company files U.S. income tax returns as prescribed by the tax laws of the jurisdictions in which it operates. In the normal course of business, the Company is subject to examination by federal and state jurisdictions, where applicable. There are currently no pending tax examinations in the U.S. The Company has not received notice of examination by any jurisdictions in the U.S.

The Company has a branch in Germany that was under examination in its local country for tax years 2016 through 2018. The Company adjusted the uncertain tax position as a result of the outcome of the tax examination for our German entity, resulting in an income tax benefit of $0.6 million for each of the three and six months ended June 30, 2022.

15. Net loss per share

As of June 30, 2022, the Company has Class A common stock and Class B common stock. According to the Company's restated certificate of incorporation, both classes have the same rights to the Company's earnings and neither of the shares have any prior or senior rights to dividends to other shares.

The Company reported a net loss attributable to common stockholders for the three and six months ended June 30, 2022 and 2021, as such basic net loss per share attributable to common stockholders was the same as diluted net loss per share attributable to common stockholders. Basic and diluted net loss per share attributable to common stockholders was calculated as follows (in thousands, except share and per share amounts):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Numerator:				
Net loss	$ (13,090)	$ (11,831)	$ (28,020)	$ (33,932)
Accretion of redeemable convertible preferred stock to redemption value	—	(1,184)	—	(1,971)
Cumulative redeemable convertible preferred stock dividends	—	(885)	—	(2,296)
Net loss attributable to common stockholders—basic and diluted	$ (13,090)	$ (13,900)	$ (28,020)	$ (38,199)
Denominator:				
Weighted average Class A common shares outstanding—basic and diluted	36,940,676	694,698	36,443,792	668,180
Weighted average Class B common shares outstanding—basic and diluted	5,553,379	—	5,902,815	—
Total shares for EPS—basic and diluted	42,494,055	694,698	42,346,607	668,180
Net loss per share attributable to Class A common stockholders—basic and diluted	$ (0.31)	$ (20.01)	$ (0.66)	$ (57.17)
Net loss per share attributable to Class B common stockholders—basic and diluted	$ (0.31)	$ —	$ (0.66)	$ —

The Company's potentially dilutive securities, which include stock options, restricted stock, redeemable convertible preferred stock, common stock warrants and preferred stock warrants, 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, 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:

	Three and Six Months Ended June 30,	
	2022	2021
Options to purchase common stock	5,673,128	4,512,084
Unvested restricted common stock	749,816	—
Warrants to purchase common stock	286,324	55,835
Options to purchase common stock under ESPP	46,477	—
Redeemable convertible preferred stock (as converted to common stock)	—	31,104,299
Warrants to purchase preferred stock (as converted to warrants to purchase common stock)	—	1,243,834
	6,755,745	36,916,052

16. Leases

The Company adopted Topic 842 on January 1, 2022 using the optional transition method to the modified retrospective approach. The impact of the adoption of Topic 842 to the Company's applicable balance sheet items as of January 1, 2022 is presented in the table below (in thousands). The standard did not have a material impact to the Company's unaudited condensed consolidated statements of operations, comprehensive loss, or cash flows.

	As Reported December 31, 2021	Adjustments ASC 842 Adoption	Adjusted January 1, 2022
Assets			
Right-of-use assets, net, operating	$ —	$ 6,039	$ 6,039
Right-of-use assets, net, financing	—	366	366
Property and equipment, net	11,304	(351)	10,953
Total assets	$ 11,304	$ 6,054	$ 17,358
Liabilities and Stockholders' Equity			
Current liabilities:			
Lease liabilities, short-term, operating	$ —	$ 1,023	$ 1,023
Lease liabilities, short-term, financing	—	33	33
Accrued expenses	10,917	(160)	10,757
Total current liabilities	$ 18,166	$ 896	$ 19,062
Lease liabilities, long-term, operating	—	5,960	5,960
Lease liabilities, long-term, financing	—	341	341
Deferred rent, long-term	813	(813)	—
Other long-term liabilities	1,210	(330)	880
Total liabilities	$ 20,189	$ 6,054	$ 26,243
Total stockholders' equity	$ 220,980	$ —	$ 220,980
Total liabilities and stockholders' equity	$ 241,169	$ 6,054	$ 247,223

The Company determines if an arrangement is or contains a lease at inception, which is the date on which the terms of the contract are agreed to, and the agreement creates enforceable rights and obligations. Under ASC 842, a contract is or contains a lease when (i) explicitly or implicitly identified assets have been deployed in the contract and

(ii) the customer obtains substantially all of the economic benefits from the use of that underlying asset and directs how and for what purpose the asset is used during the term of the contract. The Company also considers whether its service arrangements include the right to control the use of an asset. See Note 2 for more information on the Company's accounting policies for leases.

The Company leases office and manufacturing space under operating lease agreements that have initial terms ranging from approximately 8 to 10 years. The Company leases furniture under a financing lease agreement that has an initial term of approximately 8 years. Some leases include one or more options to renew, generally at our sole discretion, with renewal terms that can extend the lease term up to 5 years. In addition, certain leases contain termination options, where the rights to terminate are held by either the Company, the lessor, or both parties. Options to extend a lease are included in the lease term when it is reasonably certain that the Company will exercise the option. Options to terminate a lease are excluded from the lease term when it is reasonably certain that the Company will not exercise the option. The Company's leases generally do not contain any material restrictive covenants or residual value guarantees.

Supplemental cash flow information related to leases is as follows (in thousands):

	Six Months Ended June 30, 2022
Cash paid for amounts included in measurement of lease liabilities:	
Operating cash outflows - payments on operating leases	$ 583
Operating cash outflows - payments on financing leases	$ 21
Financing cash outflows - payments on financing leases	$ 16
Right-of-use assets obtained in exchange for new lease obligations:	
Operating leases	$ 7,605
Financing leases	$ 366

Supplemental balance sheet information related to the Company's operating and financing leases is as follows (in thousands):

	June 30, 2022
Operating Leases:	
Operating lease assets	$ 7,189
Accrued expenses and other current liabilities	$ 694
Operating lease liabilities	7,405
Total operating lease liabilities	$ 8,099
Financing Leases:	
Office furniture and fixtures	$ 386
Accumulated depreciation	(45)
Net property, plant and equipment	$ 341
Current portion of long-term debt	$ 35
Long-term debt	322
Total financing lease liabilities	$ 357
Weighted-average remaining lease term - operating leases:	7.04
Weighted-average remaining lease term - financing leases:	7.00
Weighted-average discount rate - operating leases:	3.7 %
Weighted-average discount rate - financing leases:	12.0 %

The components of lease expense were as follows (in thousands):

	Three Months Ended June 30, 2022	Six Months Ended June 30, 2022
Operating lease cost	$ 288	$ 549
Financing lease cost - amortization of right-of-use asset	12	24
Financing lease cost - interest on lease liability	11	21
Short-term lease cost	15	31
Variable lease cost	150	316
Total lease cost	$ 476	$ 941

Operating lease cost is recognized on a straight-line basis over the lease term. Total rent expense, including the Company's share of the lessors' operating expenses, was $0.4 million and $0.9 million, respectively, for the three and six months ended June 30, 2022. Financing lease cost includes asset amortization on a straight-line basis over the lease term and interest accretion calculated using the effective interest method. Total financing lease asset depreciation and interest expense was less than $0.1 million for the three and six months ended June 30, 2022.

In March 2022, the Company amended the lease for its office and manufacturing space in Lowell, Massachusetts (the "Amendment"). The Amendment increased the amount of facility space subject to the lease and extended the expiration of the lease from July 2026 to July 2029. The terms of the Amendment include options for a one-time, five-year extension of the lease and early termination of the lease in July 2026 (subject to an early termination fee), as well as a $0.3 million tenant improvement allowance. Monthly rent payments are fixed and future minimum lease payments under the lease (as amended) are $4.6 million. Included in the $4.6 million are leases with commencement dates expected later in 2022 and therefore are not recorded on the consolidated balance sheets as of June 30, 2022. The future minimum lease payments related to these leases are approximately $0.9 million. The Amendment qualified as a lease modification and resulted in a right of use asset and lease liability in the amount of $1.2 million and $1.3 million, respectively, recognized in March 2022, and an additional right of use asset and lease liability of $0.7 million recognized in May 2022.

Maturities of the Company's operating lease liabilities as of June 30, 2022 were as follows (in thousands):

	Operating Leases
2022 (excluding the six months ended June 30)	$ 624
2023	1,273
2024	1,306
2025	1,339
2026	1,372
Thereafter	3,627
Total lease payments	$ 9,541
Less imputed interest	(1,171)
Total present value of lease liabilities	$ 8,370

Maturities of the Company's financing lease liability as of June 30, 2022 were as follows (in thousands):

	Financing Leases
2022 (excluding the six months ended June 30)	$ 38
2023	75
2024	75
2025	75
2026	75
Thereafter	187
Total lease payments	$ 525
Less imputed interest	(168)
Total present value of lease liabilities	$ 357

Maturities of the Company's operating lease liabilities as of December 31, 2021 were as follows (in thousands):

	Year Ended December 31, 2021
2022	$ 1,139
2023	1,169
2024	1,199
2025	1,229
2026	1,044
Thereafter	1,953
Total minimum lease commitments	$ 7,733

17. Commitments and contingencies

Supply agreement

In March 2020, the Company entered into an agreement with a supplier to provide raw materials used in the manufacturing process. As of June 30, 2022, the Company had committed to minimum payments under these arrangements totaling $0.6 million through December 31, 2022, which includes an additional commitment related to a conversion option exercised by the Company in March 2022. The Company accrues a liability for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. The Company had less than $0.1 million and $0.1 million accrued for the supply agreement as of June 30, 2022 and December 31, 2021, respectively.

Software subscription

During the year ended December 31, 2021, the Company entered into a non-cancelable agreement with a service provider for software as a service and cloud hosting services. As of June 30, 2022, the Company had committed to minimum payments under this arrangement totaling $0.8 million through January 31, 2026. The Company accrues a liability for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. The Company had zero and $0.1 million accrued for the software subscription as of June 30, 2022 and December 31, 2021, respectively.

Indemnification agreements

In the ordinary course of business, the Company may provide indemnification of varying scope and terms to customers, vendors, lessors, 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 certain of its 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. To date, the Company has not incurred any material costs as a result of such indemnifications. The Company is not currently aware of any indemnification claims and has not accrued any liabilities related to such obligations in its condensed consolidated financial statements as of June 30, 2022 and December 31, 2021.

Legal proceedings

The Company is not a party to any litigation and does not have contingency reserves established for any litigation liabilities. 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 legal proceedings.

18. Benefit plans

The Company established a defined contribution savings plan under Section 401(k) of the Code. This plan covers all employees who meet minimum age and service requirements and allows participants to defer a portion of their annual compensation on a pre-tax basis. Matching contributions to the plan may be made at the discretion of the Company's board of directors. The Company made contributions of $0.2 million and $0.1 million to the plan during the three months ended June 30, 2022 and 2021, respectively, and made contributions of $0.5 million and $0.1 million to the plan during the six months ended June 30, 2022 and 2021, respectively.

19. Subsequent events

On August 11, 2022, the board of directors of the Company approved an organizational restructuring plan (the "Restructuring Plan") to right-size its cost structure based on its lowered 2022 outlook. The Company will continue to invest in key growth initiatives including enhancing commercial execution and key product development programs that are expected to drive future revenue growth. The Restructuring Plan involves an approximately 20% reduction in the Company's workforce, including employees, contractors and temporary employees, which is largely focused on non-commercial functions. The Company expects to record a restructuring charge of approximately $1.5 million in the third quarter of 2022 primarily related to severance, employee benefits, outplacement and related costs under the Restructuring Plan.

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 together with our consolidated condensed financial statements and the related notes appearing elsewhere in this Quarterly Report on Form 10-Q and our audited Consolidated Financial Statements and related notes thereto for the year ended December 31, 2021, included in the Annual Report on Form 10-K for the fiscal year ended December 31, 2021, filed with the SEC on March 24, 2022 (the "2021 Form 10-K"). 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 the 2021 Form 10-K, 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 an innovative life sciences technology company that enables the safe and efficient manufacture of pharmaceutical products through our rapid automated microbial quality control, or MQC, detection platform. We develop, manufacture, market and sell the Growth Direct system and related proprietary consumables, and value-added services to enable rapid MQC testing in the manufacture of biologics, cell and gene therapies, vaccines, sterile injectables, and other healthcare products. Our system delivers the power of industrial automation to bioprocessing and pharmaceutical manufacturing firms by modernizing and digitizing their MQC operations. Our Growth Direct platform, developed with over 15 years of active feedback from our customers, was purpose-built to meet the growing demands posed by the increasing scale, complexity, and regulatory scrutiny confronting global pharmaceutical manufacturing. Our Growth Direct platform comprises the Growth Direct system, optional laboratory information management system, or LIMS, connection software (which the majority of our customers purchase), proprietary consumables, and comprehensive field service, validation services and post-warranty service contracts. Once embedded and validated in our customers' facilities, our Growth Direct platform provides for recurring revenues through ongoing sales of consumables and service contracts.

Our technology fully automates and digitizes the process of pharmaceutical MQC and is designed to enable our customers to perform this critical testing process more efficiently, accurately, and securely. Our Growth Direct platform accelerates time to results by several days, a 50% improvement over the traditional method, and reduces MQC testing to a simple two-step workflow, eliminating up to 85% of the manual steps of traditional MQC, generating significant time, operational, and cost savings for our customers. We seek to establish the Growth Direct as the trusted global standard in automated MQC by delivering the speed, accuracy, security, and data integrity compliance that our customers depend on to ensure patient safety and consistent drug supply.

Since inception, we have devoted a majority of our resources to designing, developing, and building our proprietary Growth Direct platform and associated products, launching our Growth Direct platform commercially, expanding our sales and marketing infrastructure to grow our sales, building a global customer support team to deliver our value-added services, investing in robust manufacturing and supply chain operations to serve our customers globally, and providing general and administrative support for these operations. To date, we have funded our operations primarily with proceeds from sales of preferred stock, proceeds from our IPO, borrowings under loan agreements and product and service sales as well as our cost-reimbursement contract with the U.S. Department of Health and Human Services Biomedical Advanced Research & Development Authority, or BARDA. All funding initially authorized under this contract was fully earned by the fourth quarter of 2021. We are now in the process of closing out our BARDA contract, which includes a true-up of actual reimbursable costs to those previously billed at provisional rates for each year of performance. Once the amount of each annual true-up is determined and approved by BARDA and they identify available funds to reimburse us for that amount, we expect to enter into a contract modification and invoice BARDA for the true-up amount, at which point we will recognize corresponding incremental non-commercial revenue in that amount. Based on the above and our current expectations for the timing of the true-up process, we do not currently anticipate recognizing any non-commercial revenue in the year ending December 31, 2022. However, we do anticipate recognizing the annual true-ups as non-commercial revenue as outlined above, which we currently expect to take place after 2022 over a period of up to several years.

On July 19, 2021, we closed an initial public offering of our Class A common stock, or the IPO, which resulted in the sale of 7,920,000 shares of our Class A common stock at a public offering price of $20.00 per share, before underwriting discounts. The IPO resulted in gross proceeds of $158.4 million and net proceeds of approximately $143.8 million after deducting underwriting discounts, commissions and estimated offering expenses payable by us. Additionally, on August 4, 2021, the underwriters exercised their overallotment option in part and purchased 1,086,604 shares of Class A common stock at the initial public offering price of $20.00 per share less discounts and commissions. The overallotment option exercise resulted in net proceeds of approximately $20.2 million. Immediately prior to the completion of the IPO, all of the outstanding shares of our Series A1, Series B1, Series C1 and Series D1 preferred stock converted into 24,200,920 shares of Class A common stock and all of the outstanding shares of our Series C2 and Series D2 converted into 6,903,379 shares of Class B common stock. As of June 30, 2022, no shares of our preferred stock remained outstanding.

On August 11, 2022, our board of directors approved an organizational restructuring plan, or the Restructuring Plan, to right-size our cost structure based on our lowered 2022 outlook. We will continue to invest in key growth initiatives including enhancing commercial execution and key product development programs that are expected to drive future revenue growth. The Restructuring Plan involves an approximately 20% reduction in the Company's workforce, including employees, contractors and temporary employees, which is largely focused on non-commercial functions. We expect to record a restructuring charge of approximately $1.5 million in the third quarter of 2022 primarily related to severance, employee benefits, outplacement and related costs under the Restructuring Plan. We expect the Restructuring Plan to result in approximately $8.0 - $9.0 million in annualized cost savings by the first quarter 2023.

On August 12, 2022, we announced our board of directors' decision to reject an unsolicited, non-binding proposal we received from Kennedy Lewis Investment Management LLC to acquire the entire company for $5.00 per share in cash and the commencement of a process to review strategic alternatives. No timetable has been established for the completion of this process, and we do not expect to disclose developments unless and until our board of directors has concluded that disclosure is appropriate or required.

Since our inception, we have incurred net losses in each year. We generated revenue of $3.9 million and $6.1 million for the three months ended June 30, 2022 and 2021, respectively, and incurred net losses of $13.1 million and $11.8 million for those same periods, respectively. We generated revenue of $8.0 million and $11.1 million for the six months ended June 30, 2022 and 2021, respectively, and incurred net losses of $28.0 million and $33.9 million for those same periods, respectively. As of June 30, 2022, we had an accumulated deficit of $343.1 million. We expect to continue to incur net losses for the foreseeable future in connection with our ongoing activities, including:

- growing sales of our products in both the United States and international markets by further expanding our sales and marketing capabilities;
- scaling our manufacturing and supply chain processes and infrastructure to meet growing demand for our products;
- investing in research and development to develop new products and further enhance our existing products;
- protecting and building on our intellectual property portfolio; and
- attracting, hiring and retaining qualified personnel.

Until such time as we can generate revenue sufficient to achieve profitability, we expect to finance our operations through a combination of equity offerings and debt financings. If we are unable to raise capital or enter into such agreements as, and when, needed, we may have to significantly delay, scale back or discontinue our expansion plans including the further development and commercialization efforts of one or more of our products, or may be forced to reduce or terminate our operations.

We believe that our cash and cash equivalents and investments as of June 30, 2022 enable us to fund our operating expenses and capital expenditure requirements for at least the next twelve months. We have based this estimate on assumptions that may prove to be wrong, and we could exhaust our available capital resources sooner than we expect. See "Liquidity and Capital Resources."

COVID-19 update

In response to the COVID-19 pandemic and various resulting government directives, we took proactive measures to protect the health and safety of our employees, customers, and partners, while maintaining our ability to supply and service our customers. We continue to monitor the implications of the ongoing COVID-19 pandemic on our business, as well as our customers' and suppliers' businesses. Some of the measures we have taken follow:

- Our production, shipping and customer service functions remain operational to maintain a continuous supply of products to our customers. We are communicating regularly with our suppliers and logistics partners so that our supply chain remains intact and we have not experienced any material supply issues to date. Our customer service teams around the world are operating remotely and remain available to assist our customers and partners as needed.

- As a result of travel restrictions and shelter-in-place orders, we experienced an impact on our ability to sell, ship, install and validate systems, as well as train customers in certain geographies, which negatively impacted our product and service revenues during 2022 and 2021. Despite these restrictions, we were able to implement several measures including remote and customer-assisted support activities to support the continued growth of our business.

- We continue to actively review and manage costs to navigate the current environment.

As access to customer sites and in-person engagement improved gradually in the three months ended June 30, 2022 (and through the date of this Quarterly Report on Form 10-Q), we continue to gain deeper insight into the challenges the pandemic created for our customers in advancing capital purchasing decisions and for us in accurately assessing the timing of sales opportunities.

While the disruption due to COVID-19, and its variants, is currently expected to be temporary, there is considerable uncertainty around its duration. Further disruptions in the future may impact our operating results. However, the related financial impact and duration of these disruptions cannot be reasonably estimated at this time.

Effects of inflation and interest rates

The current inflationary environment and rising interest rates could have a negative impact on our results of operations, cash flows and overall financial condition. We may experience inflationary pressures on significant cost categories including labor, materials and freight. We continue to monitor the impact of inflation on these costs in order to minimize its effects through productivity improvements and cost reductions. There can be no assurance, however, that our operating results will not be affected by inflation in the future. In addition, inflation and increased interest rates may decrease demand for our Growth Direct systems, as our customers may face economic uncertainty as a result. A decrease in demand for our products or increases in our costs, as well as any steps we may take to mitigate changes, could impact our overall growth. However, the related financial impact cannot be reasonably estimated at this time.

Factors affecting our performance

We believe that our financial performance has been, and in the foreseeable future will continue to be, primarily driven by multiple factors as described below, each of which presents growth opportunities for our business. These factors also pose important challenges that we must successfully address in order to sustain our growth and improve our results of operations. Our ability to successfully address these challenges is subject to various risks and uncertainties, including those described under the section titled "Risk Factors" to this Quarterly Report on Form 10-Q and other factors as set forth in Part I, Item 1A of the 2021 Form 10-K.

New customer adoption of the Growth Direct platform

Our financial performance has largely been driven by, and a key factor to our future success will be, our ability to increase the global adoption of our Growth Direct platform in our key markets. We plan to drive global customer adoption through both direct and indirect sales and marketing organizations in North America, Europe, Asia and Australia.

We are investing in these organizations and expect to continue to do so in the future. As part of this effort, we increased our direct sales and marketing team by 18% during the six months ended June 30, 2022. We expect the productivity of new resources in this organization to be fully realized over time.

Expansion within our existing customer base

There is an opportunity to increase broader adoption and utilization of our Growth Direct platform throughout our existing customers' organizations by existing customers purchasing more systems. These additional systems will allow our existing customers to convert more of their test volume at existing locations, to support multiple locations, to meet redundancy requirements, or to increase capacity. As of June 30, 2022, a majority of our customers have purchased Growth Direct systems for multiple sites, and approximately 63% of our customers have purchased multiple Growth Direct systems. Increased utilization amongst existing customers can also occur as customers advance through the Growth Direct platform adoption cycle from early validation of initial applications to validation and conversion of multiple applications on the Growth Direct platform.

Innovating and launching new products on the Growth Direct platform

We believe the depth, scalability and robust capabilities of our Growth Direct platform allow us to address key opportunities and challenges facing MQC testing in the pharmaceutical industry. As an innovative leader in automated MQC testing, we intend to invest in further enhancements in our existing Growth Direct platform as well as end-to-end workflow solutions in our core market. We plan to further invest in research and development to support the expansion of our Growth Direct platform through development and launch of new applications to capture greater share of customer testing volume, new product formats to broaden our ability to serve different market segments and launch of new products and technologies to address adjacent segments of the overall MQC workflow. We plan to continue to hire employees with the necessary scientific and technical backgrounds to enhance our existing products and help us introduce new products to market. We expect to incur additional research and development expenses as a result. By expanding and continuously enhancing the Growth Direct platform, we believe we can drive incremental revenue from existing clients as well as broaden the appeal of our solutions to potential new customers.

Expanding Growth Direct into adjacent end markets

We have identified several market expansion opportunities including deploying our existing Growth Direct platform into the personal care products market. We continuously seek to identify other market opportunities where our Growth Direct platform could enhance MQC testing. We could expand into these markets through our existing technologies, through adapting our existing technologies, or through developing new products to specifically address the unmet needs of these adjacent markets. We may drive our expansion into these markets by building commercial infrastructure to specifically target customers in those markets, or by partnering with other participants in those markets.

Revenue mix

Our revenue is derived from sales of our Growth Direct systems, our LIMS connection software, proprietary consumables, services and our cost-reimbursement contract with BARDA. Growth Direct system revenue involves a capital selling process and tends to be somewhat concentrated within a small (but different) group of customers each year, it is subject to variability from quarter to quarter. While we expect Growth Direct systems revenue to be the largest contributor to our revenue over the near- to mid-term, as our base of validated Growth Direct systems continues to grow, we expect our recurring revenue (consumables and service contracts) to grow at a faster rate than our non-recurring revenues (Growth Direct systems, validation and other services), which we expect to drive variability and longer-term trends in our revenue mix.

Our non-commercial revenue has historically been generated from a long-term contract with BARDA. All funding awarded to-date under our contract with BARDA was fully earned by the fourth quarter of 2021. We are now in the process of closing out our BARDA contract, which includes a true-up of actual reimbursable costs to those previously billed at provisional rates for each year of performance. Once the amount of each annual true-up is determined and approved by BARDA and they identify available funds to reimburse us for that amount, we expect to enter into a contract modification and invoice BARDA for the true-up amount, at which point we will recognize corresponding incremental non-commercial revenue in that amount. Based on the above and our current expectations for the timing of the true-up process, we do not currently anticipate recognizing any non-commercial revenue in the year ending December 31, 2022. However, we do anticipate recognizing the annual true-ups as non-commercial revenue as outlined above, which we currently expect to take place after 2022 over a period of up to several years.

Key business metrics

We regularly review the following key business metrics to evaluate our business, measure our performance, identify trends affecting our business, formulate financial projections and make strategic decisions. We believe that the following metrics are representative of our current business; however, we anticipate these may change or be substituted for additional or different metrics as our business grows and evolves.

	Three Months Ended June 30,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Systems placed:				
Systems placed in period	2	8	(6)	(75.0)%
Cumulative systems placed	120	103	17	16.5 %
Systems validated:				
Systems validated in period	3	11	(8)	(72.7)%
Cumulative systems validated	96	63	33	52.4 %
Product and service revenue — total	$ 3,860	$ 5,694	$ (1,834)	(32.2)%
Product and service revenue — recurring	$ 2,500	$ 1,904	$ 596	31.3 %

	Six Months Ended June 30,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Systems placed:				
Systems placed in period	4	16	(12)	(75.0)%
Cumulative systems placed	120	103	17	16.5 %
Systems validated:				
Systems validated in period	12	12	—	— %
Cumulative systems validated	96	63	33	52.4 %
Product and service revenue — total	$ 8,020	$ 10,479	$ (2,459)	(23.5)%
Product and service revenue — recurring	$ 5,158	$ 3,368	$ 1,790	53.1 %

Growth Direct system placements

We consider a Growth Direct system to be "placed" upon transfer of control of the system to the customer, at which point the revenue for that system is recognized. We regularly review the number of Growth Direct systems placed and cumulative Growth Direct system placements in each period as a leading indicator of our business performance. Our revenue has historically been driven by, and in the future will continue to be impacted by, the rate of Growth Direct system placements as a reflection of our success selling and delivering our products. We expect our Growth Direct system placements to continue to grow over time as we increase penetration in our existing markets and expand into new markets.

The number of Growth Direct system placements and rate of growth varies from period-to-period due to factors including, but not limited to, Growth Direct system order volume and timing, and access to customer sites (including COVID-19 related restrictions). As a result, we expect to experience continued variability in our period-to-period number of Growth Direct system placements due to the aforementioned factors.

Validated systems

We regularly review the number of Growth Direct systems validated and cumulative Growth Direct systems validated in each period as indicators of our business performance. Management focuses on validated Growth Direct systems as a leading indicator of likely future recurring revenue as well as a reflection of our success validating placed systems. We expect our validated Growth Direct systems to continue to grow over time as we increase our base of cumulative systems placed and then validate those systems. After a Growth Direct system is placed with a customer and installed, we work with the customer to validate the system, which typically takes anywhere from three to nine months. Once a validation has been completed, we generally expect our customers to transition from their legacy manual method to our automated method and begin regular utilization of consumables over a period of up to three months.

The number of validated Growth Direct systems and rate of growth varies from period-to-period due to factors including, but not limited to, Growth Direct system order volume and timing, whether customers have previously validated Growth Direct systems within their site or network, access to customer sites (including as a result of COVID-19 related restrictions), customer site readiness and the time to install and validate each individual system. As a result, we expect to experience continued fluctuations in our period-to-period number of Growth Direct systems validated due to the aforementioned factors.

Product and service revenue

We regularly assess trends relating to our combined product and service revenue as an indicator of our business performance. Product and service revenue represents all of our commercial revenue for the business. It excludes non-commercial revenue, which typically supports other business functions such as research and development and is by its nature subject to significant variability.

Recurring revenue

We regularly assess trends relating to recurring revenue, which is the revenue from consumables and service contracts, based on our product offerings, our customer base and our understanding of how our customers use our products. Recurring revenue was 64.8% and 31.1% of our total revenue for the three months ended June 30, 2022 and 2021, respectively. Recurring revenue was 64.3% and 30.3% of our total revenue for the six months ended June 30, 2022 and 2021, respectively. Our recurring revenue as a percentage of the total product and service revenue will generally vary based upon the number of Growth Direct systems placed and validated in the period, as well as other variables such as the volume of tests being conducted, and the test application(s) being used on those Growth Direct systems. As our base of validated systems continues to grow, we expect our recurring revenue streams to grow at a faster rate that will ultimately result in our recurring revenue constituting the majority of our revenue over the longer term.

Components of results of operations

Revenue

We generate revenue from sales of our Growth Direct system including our LIMS connection software, consumables, validation services, service contracts and field service as well as our contractual arrangement with BARDA. We primarily sell our products and services through direct sales representatives. The arrangements are noncancelable and nonrefundable after ownership passes to the customer.

	Three Months Ended June 30, 2022 (in thousands)	Percentage of total revenue	Three Months Ended June 30, 2021 (in thousands)	Percentage of total revenue
Product revenue	$ 2,440	63.2 %	$ 4,088	66.7 %
Service revenue	1,420	36.8 %	1,606	26.2 %
Non-commercial revenue	—	- %	436	7.1 %
Total revenue	$ 3,860	100.0 %	$ 6,130	100.0 %

	Six Months Ended June 30, 2022 (in thousands)	Percentage of total revenue	Six Months Ended June 30, 2021 (in thousands)	Percentage of total revenue
Product revenue	$ 5,003	62.4 %	$ 7,806	70.2 %
Service revenue	3,017	37.6 %	2,673	24.0 %
Non-commercial revenue	—	- %	646	5.8 %
Total revenue	$ 8,020	100.0 %	$ 11,125	100.0 %

Product revenue

We derive product revenue primarily from the sale of our Growth Direct systems and related consumables as well as our LIMS connection software, which the majority of our customers purchase. As of June 30, 2022, we had placed 120 Growth Direct systems to over thirty customers globally, including over half of the top twenty pharmaceutical companies as measured by revenue and approximately 30% of globally approved cell and gene therapies.

Growth Direct systems

Growth Direct system revenue is a non-recurring product revenue stream that we recognize as revenue upon transfer of control of the system to the customer. The Growth Direct system is fully functional for use by the customer upon delivery, and, as such, transfer of control occurs at shipment or delivery depending on contractual terms.

We expect our Growth Direct system revenue to continue to grow over time as we increase system placements in our existing customers and markets and expand into new customers and markets.

Consumables

Our consumable revenue is a recurring product revenue stream composed of two proprietary consumables to capture test samples for analysis on the Growth Direct system, an Environmental Monitoring, or EM, consumable, and a Water/Bioburden consumable, or W/BB consumable. Both proprietary consumables support the growth-based compendial method for MQC testing mandated by global regulators and provide results that are comparable to traditional consumables. Our consumables are designed with features that enable automation on the Growth Direct system, with bar coding for tracking and data integrity, and physical characteristics for robotic handling, to support vision detection, and to prevent counterfeiting.

We expect consumable revenue to increase in future periods as our base of cumulative validated Growth Direct systems grows and those systems utilize our consumables on a recurring, ongoing basis.

LIMS Connection Software

Our LIMS connection software is a non-recurring product revenue stream. Although optional, the majority of our customers elect to purchase this software, which allows Growth Direct systems to export result reports and securely link to a customer's two-way LIMS connection software to completely eliminate manual data entry and drive productivity.

Service revenue

We derive service revenue from validation services, field service including installations, and service contracts sold to our customers. Revenue from validation services and field service are non-recurring service revenue streams, while revenue from service contracts is a recurring service revenue stream.

We offer our customers validation services (including related documentation) that enable them to replace their existing manual testing method and utilize their Growth Direct systems in compliance with relevant MQC regulations. Validation services are recognized as revenue over time as these services are provided to the customer.

We offer our customers service contracts that can be purchased after the expiration of the one-year assurance warranty that all of our customers receive with the purchase of a Growth Direct system. Under these contracts, they are entitled to receive phone support, emergency on-site maintenance support and two preventative maintenance visits per year. These service contracts generally have fixed fees and a term of one year. We recognize revenue from the sale of service contracts over time as these services are provided over the respective contract term.

We also offer our customers field service which consists of services provided by our field service engineers to install Growth Direct systems at customer sites. We recognize revenue from field service over time as these services are provided to the customer.

We expect service revenue to increase in future periods as the number of placed and validated Growth Direct systems grows. Specifically, we expect to generate increasing non-recurring revenue from validation services and field service for newly placed systems and increasing recurring revenue from service contracts for validated systems. While we expect service revenue growth to follow Growth Direct placements, such revenue is subject to variability based on other factors such as customer readiness and site construction.

Non-commercial revenue

We have generated non-commercial revenue from long-term contracts with governmental agencies and third parties. To date, our non-commercial revenue has been derived from contracts with BARDA. All funding awarded to-date under our contract with BARDA was fully earned by the fourth quarter of 2021. We are now in the process of closing out our BARDA contract, which includes a true-up of actual reimbursable costs to those previously billed at provisional rates for each year of performance. Once the amount of each annual true-up is determined and approved by BARDA and they identify available funds to reimburse us for that amount, we expect to enter into a contract modification and invoice BARDA for the true-up amount, at which point we will recognize corresponding incremental non-commercial revenue in that amount. Based on the above and our current expectations for the timing of the true-up process, we do not currently anticipate recognizing any non-commercial revenue in the year ending December 31, 2022. However, we do anticipate recognizing the annual true-ups as non-commercial revenue as outlined above, which we currently expect to take place after 2022 over a period of up to several years.

Costs and operating expenses

Costs of revenue

Cost of product revenue primarily consists of costs for raw material parts and associated freight, shipping and handling costs, salaries and other personnel costs including stock-based compensation expense, contract manufacturer costs, scrap, warranty cost, inventory reserves, royalties, depreciation and amortization expense, allocated information technology and facility-related costs, overhead and other costs related to those sales recognized as product revenue in the period.

Cost of service revenue primarily consists of salaries and other personnel costs including stock-based compensation expense, travel costs, materials consumed when performing installations, validations and other services, allocated information technology and facility-related costs, costs associated with training, and other expenses related to service revenue recognized in the period.

Cost of non-commercial revenue primarily consisted of salaries and other personnel costs including stock-based compensation expense, consulting expense, materials, travel and other costs related to the revenue recognized as non-commercial revenue during the period. Our contract with BARDA was subject to the Federal Acquisition Regulation, or FAR and is priced based on estimated or actual costs of producing goods or providing services. The FAR provides guidance on the types of costs that are allowable in establishing prices for goods or services provided under U.S. government contracts. All obligations under the BARDA contract were performed by the fourth quarter of 2021 and, as such, we do not currently anticipate recognizing any costs of non-commercial revenue in the year ending December 31, 2022.

Research and development

Research and development expenses consist primarily of costs incurred for our research activities, product development, hardware and software engineering and consultant services and other costs associated with our technology Growth Direct platform and products, which include:

- employee-related expenses, including costs for salaries, bonuses and other personnel costs including stock-based compensation expense, for employees engaged in research and development functions;
- the cost of developing, maintaining and improving new and existing product designs;
- the cost of hardware and software engineering;
- research materials and supplies;
- external costs of outside consultants engaged to conduct research and development associated with our technology and products; and
- information technology and facilities expenses, which include direct and allocated expenses for rent, maintenance of facilities and insurance as well as related depreciation and amortization.

Our research and development costs are expensed as incurred. We believe that our continued investment in research and development is essential to our long-term competitive position, and we expect these expenses to increase in future periods.

Sales and marketing

Sales and marketing expenses consist primarily of salaries, commissions, benefits and other personnel costs including stock-based compensation expense as well as costs relating to travel, consulting, public relations and allocated information technology and facility-related costs for our employees engaged in sales and marketing activities. We expect sales and marketing expenses to increase in future periods as the number of sales and marketing personnel grows and we continue to expand our geographic reach and capabilities, broaden our customer base and introduce new products.

General and administrative

General and administrative expenses consist primarily of salaries, bonuses and other personnel costs including stock-based compensation expense for our finance, legal, human resources and general management employees, as well as professional fees for legal, patent, accounting, audit, investor relations, recruiting, consulting and other services. General and administrative expenses also include direct and allocated information technology and facility-related costs. General and administrative expenses are expected to increase in future periods as the number of administrative personnel grows to support increasing business size and complexity. We have also incurred incremental accounting, audit, legal, regulatory, compliance and director and officer insurance costs as well as investor relations expenses associated with operating as a public company. We anticipate that our general and administrative expenses will increase in the near future as we explore our strategic alternatives. These increases will likely include legal fees and fees to outside consultants, among other expenses.

Other income (expense)

Interest expense

Interest expense is comprised of interest cost associated with outstanding borrowings under our loan and security agreements, amortization of deferred financing costs and debt discounts associated with such arrangements.

Change in fair value of preferred stock warrant liability

In connection with the May 2020 term loan facility, we entered into with a lender, or the 2020 Term Loan, we issued 1,195,652 warrants to purchase shares of Series C1 Preferred Stock at an exercise price of $1.15 per share. These warrants were immediately exercisable and expire 10 years after the issuance date. We also have other outstanding warrants to purchase preferred stock issued in connection with previous financing arrangements.

We classified all of our warrants to purchase preferred stock as a liability on our consolidated balance sheets until our IPO because the warrants were freestanding financial instruments that may require us to transfer assets upon exercise. The liability associated with each of these warrants was initially recorded at fair value upon the issuance date and was subsequently remeasured to fair value at each reporting date. The resulting change in the fair value of the preferred stock warrant liability was recorded as a component of other income (expense) in our consolidated statements of operations. We continued to recognize changes in the fair value of this preferred stock warrant liability at each reporting period until the IPO when they qualified for equity classification.

In connection with the IPO, the preferred stock warrants were automatically converted to Class A common stock warrants. We determined the event resulted in equity classification of the Class A common stock warrants and derecognized the fair value of the preferred stock warrant liability as of the IPO date and reclassified to equity.

Other income

Other income primarily consists of interest income as well as other miscellaneous income unrelated to our core operations.

Income tax (benefit) expense

We generated significant taxable losses during the three and six months ended June 30, 2022 and 2021 and, therefore, have not recorded any U.S. federal or state income tax expense during those periods. However, we did record an immaterial amount of foreign income tax expense during each of those periods. Additionally, as a result of a favorable outcome related to the tax examination for our Germany entity, the Company recorded an income tax benefit of $0.6 million for the three and six months ended June 30, 2022.

Results of operations

Comparison of the three months ended June 30, 2022 and 2021

The following table summarizes our results of operations for the three months ended June 30, 2022 and 2021:

	Three Months Ended June 30,		Change	
	2022	2021	Amount	%
	(in thousands)			
Revenue:				
Product revenue	$ 2,440	$ 4,088	$ (1,648)	(40.3)%
Service revenue	1,420	1,606	(186)	(11.6)%
Non-commercial revenue	—	436	(436)	(100.0)%
Total revenue	3,860	6,130	(2,270)	(37.0)%
Costs and operating expenses:				
Cost of product revenue	3,235	6,092	(2,857)	(46.9)%
Cost of service revenue	1,846	1,344	502	37.4 %
Cost of non-commercial revenue	—	472	(472)	(100.0)%
Research and development	2,965	2,337	628	26.9 %
Sales and marketing	3,484	3,122	362	11.6 %
General and administrative	6,404	3,625	2,779	76.7 %
Total costs and operating expenses	17,934	16,992	942	5.5 %
Loss from operations	(14,074)	(10,862)	(3,212)	29.6 %
Other income (expense):				
Interest expense	(10)	(924)	914	(98.9)%
Change in fair value of preferred stock warrant liability	—	(35)	35	(100.0)%
Other income (expense), net	381	8	373	4,662.5 %
Total other income (expense), net	371	(951)	1,322	(139.0)%
Loss before income taxes	(13,703)	(11,813)	(1,890)	16.0 %
Income tax (benefit) expense	(613)	18	(631)	(3,505.6)%
Net loss	$ (13,090)	$ (11,831)	$ (1,259)	10.6 %

Revenue

Product revenue decreased by $1.6 million, or 40.3%. The decrease in product revenue was primarily the result of fewer Growth Direct system placements. The number of system placements and rate of growth varies from period-to-period due to factors including, but not limited to, the volume and timing of system orders. Higher shipments of consumables attributable to an increase in the cumulative number of validated Growth Direct systems had a favorable impact of $0.7 million on our revenue growth and partially offset the decline due to system placements.

Service revenue decreased by $0.2 million, or 11.6%. The decrease in service revenue was primarily due to a $0.6 million decrease in validation revenue related to the timing and volume of validation services provided to customers. This was partially offset by an increase in revenue from service contracts and installations of $0.4 million related to an increase in the cumulative number of Growth Direct systems installed and on service contracts.

Non-commercial revenue was zero and $0.4 million, for the three months ended June 30, 2022 and 2021, respectively. All funding under our contract with BARDA was fully earned by the fourth quarter of 2021 and, as such, we do not currently anticipate recognizing any non-commercial revenue in the year ending December 31, 2022.

During the three months ended June 30, 2021, restrictions on travel and access to customer sites related to COVID-19, and its variants, negatively impacted our ability to sell, ship, install and validate systems, as well as train customers in certain geographies. Although travel restrictions have gradually eased in certain geographies in the three months ended June 30, 2022, travel restrictions negatively impacted our product and service revenue in the period. While we expect these disruptions may continue to impact our operating results, the related financial impact and duration of these disruptions cannot be reasonably estimated at this time.

Costs and operating expenses

Costs of revenue

Cost of product revenue decreased by $2.9 million, or 46.9%. The reduction in cost of product revenue was driven by fewer Growth Direct systems placed in the period, partially offset by an increase in consumables costs due to higher unit volume sold. On a net basis, these factors accounted for a $0.8 million decrease in cost of product revenue. In addition, material cost savings due to increased manufacturing efficiency and increased absorption of overhead costs in consumables resulted in an additional $1.1 million reduction in cost of product revenue. The remainder of the decrease was attributable to a $0.7 million decrease in temporary labor support and other compensation and employee benefit costs as well as a $0.3 million reduction in other cost of product revenue.

Cost of service revenue increased by $0.5 million, or 37.4%. This increase was driven by an increase of $0.3 million due to higher headcount-related costs associated with additional validation and field service employees hired in 2021 and 2022 as well as an increase in travel-related costs correlating with an increase in field service and validation activity to support our growing base of Growth Direct systems in the field. The remaining $0.2 million of the increase in cost of service revenue was attributable to an increase in other costs.

Cost of non-commercial revenue was zero for the three months ended June 30, 2022, compared to $0.5 million for the three months ended June 30, 2021. All funding under our BARDA contract was fully earned by the fourth quarter of 2021 and, as such, we do not currently anticipate recognizing any corresponding costs in the year ending December 31, 2022.

Research and development

	Three Months Ended June 30,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Research and development	$ 2,965	$ 2,337	$ 628	26.9 %
Percentage of total revenue	76.8 %	38.1 %		

Research and development expenses increased by $0.6 million, or 26.9%. This increase was primarily due to an increase of $0.5 million in employee-related costs due primarily to higher headcount and an increase in other general research and development costs of $0.1 million.

Sales and marketing

	Three Months Ended June 30,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Sales and marketing	$ 3,484	$ 3,122	$ 362	11.6 %
Percentage of total revenue	90.3 %	50.9 %		

Sales and marketing expenses increased by $0.4 million, or 11.6%. This increase was due to employee-related costs of $1.0 million primarily due to the expansion of our marketing organization to support increased commercial and marketing activities and an increase of $0.2 million in facilities and information technology-related costs to support increased headcount. These increases were partially offset by a $1.0 million decrease in consulting expenses, which were incurred during the three months ended June 30, 2021 for non-recurring marketing and commercial strategy projects. A $0.2 million increase in other costs also contributed to the increase.

General and administrative

	Three Months Ended June 30, 2022	Three Months Ended June 30, 2021	Change Amount	Change %
	(dollars in thousands)			
General and administrative	$ 6,404	$ 3,625	$ 2,779	76.7 %
Percentage of total revenue	165.9 %	59.1 %		

General and administrative expenses increased by $2.8 million, or 76.7%. This increase was primarily driven by costs required to operate as a public company. This included a $1.2 million increase in employee-related costs related to higher headcount and a $0.8 million increase related to public company business insurance and compensation of the non-employee members of our board of directors, and $0.3 million in incremental depreciation and amortization costs driven by additional office space and related amortization of leasehold improvements. The remaining $0.5 million of the increase related to other general and administrative expenses.

Other income (expense)

Interest expense

Interest expense for the three months ended June 30, 2022 and 2021 was less than $0.1 million and $0.9 million, respectively. The decrease of $0.9 million, or 98.9%, was due to the repayment of our 2020 Term Loan in September 2021.

Change in fair value of preferred stock warrant liability

The change in fair value of preferred stock warrant liability was zero for the three months ended June 30, 2022, compared to a loss of $35 thousand for the three months ended June 30, 2021. The loss in the prior year was due to an increase in the fair value of the underlying preferred stock in that period.

Other income (expense)

Other income increased by $0.4 million, or 4,662.5%. The increase is due an increase in investment activity resulting in additional investment income.

Income tax (benefit) expense

Income tax (benefit) expense was a benefit of $0.6 million for the three months ended June 30, 2022 compared to $18 thousand for the three months ended June 30, 2021. The expense was recorded for our German subsidiary. During the three months ended June 30, 2022, we adjusted our uncertain tax liability as a result of the outcome of the tax examination for our German subsidiary for the tax years 2016 through 2018, resulting in favorable income tax expense for the period.

Comparison of the six months ended June 30, 2022 and 2021

The following table summarizes our results of operations for the six months ended June 30, 2022 and 2021:

	Six Months Ended June 30, 2022	Six Months Ended June 30, 2021	Change Amount	Change %
	(dollars in thousands)			
Revenue:				
Product revenue	$ 5,003	$ 7,806	$ (2,803)	(35.9)%
Service revenue	3,017	2,673	344	12.9 %
Non-commercial revenue	—	646	(646)	(100.0)%
Total revenue	8,020	11,125	(3,105)	(27.9)%
Costs and operating expenses:				
Cost of product revenue	7,593	11,602	(4,009)	(34.6)%
Cost of service revenue	3,572	2,481	1,091	44.0 %
Cost of non-commercial revenue	—	886	(886)	(100.0)%
Research and development	6,490	4,485	2,005	44.7 %
Sales and marketing	6,940	5,397	1,543	28.6 %
General and administrative	12,498	6,827	5,671	83.1 %
Total costs and operating expenses	37,093	31,678	5,415	17.1 %
Loss from operations	(29,073)	(20,553)	(8,520)	41.5 %
Other income (expense):				
Interest expense	(21)	(1,856)	1,835	(98.9)%
Change in fair value of preferred stock warrant liability	—	(11,483)	11,483	(100.0)%
Other income (expense)	484	(3)	487	(16,233.3)%
Total other income (expense), net	463	(13,342)	13,805	(103.5)%
Loss before income taxes	(28,610)	(33,895)	5,285	(15.6)%
Income tax (benefit) expense	(590)	37	(627)	(1,694.6)%
Net loss	$ (28,020)	$ (33,932)	$ 5,912	(17.4)%

Revenue

Product revenue decreased by $2.8 million, or 35.9%. The decrease in product revenue was primarily attributable to fewer Growth Direct system placements, partially offset by higher volume of consumable shipments due to an increase in cumulative number of validated Growth Direct systems.

Service revenue increased by $0.3 million, or 12.9%. The increase in service revenue was primarily due to a $0.6 million increase in service contract revenue, driven by an increase in cumulative Growth Direct systems validated, partially offset by a $0.3 million decrease in validation revenue related to the timing and volume of validation services provided to customers in the periods.

Non-commercial revenue was zero and $0.6 million for the six months ended June 30, 2022 and 2021, respectively. All funding under our BARDA contract was fully earned by the fourth quarter of 2021 and, as such, we do not currently anticipate recognizing any non-commercial revenue in the year ending December 31, 2022.

Costs and operating expenses

Costs of revenue

Cost of product revenue decreased by $4.0 million, or 34.6%. The reduction in cost of product revenue was driven by fewer systems placed in the period, partially offset by an increase in consumable costs due to higher unit volume sold. On a net basis, these factors accounted for a $1.5 million reduction in cost of product revenue. In addition, material cost savings due to increased manufacturing efficiency and increased absorption of overhead costs in consumables resulted in an additional $1.6 million reduction in cost of product revenue. The remainder of the decrease was attributable to a $0.7 million decrease in temporary labor support and other compensation and employee benefit costs as well as a $0.2 million reduction in other costs of product revenue.

Cost of service revenue increased by $1.1 million, or 44.0%. This increase was primarily due to $0.8 million of incremental spend on headcount-related costs, including increased travel costs, associated with additional validation and field service employees hired during 2021 and 2022 to support increased service activity. An increase in field service material costs of $0.3 million also contributed to the increase in cost of service revenue.

Cost of non-commercial revenue was zero for the six months ended June 30, 2022, compared to $0.9 million for the six months ended June 30, 2021. All funding under our BARDA contract was fully earned by the fourth quarter of 2021 and, as such, we do not currently anticipate recognizing any corresponding costs in the year ending December 31, 2022.

Research and development

	Six Months Ended June 30,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Research and development	$ 6,490	$ 4,485	$ 2,005	44.7 %
Percentage of total revenue	80.9 %	40.3 %		

Research and development expenses increased by $2.0 million, or 44.7%. This increase was primarily due to an increase of $1.9 million in employee-related costs due primarily to higher headcount and a net increase of $0.1 million in other general research and development expenses.

Sales and marketing

	Six Months Ended June 30,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Sales and marketing	$ 6,940	$ 5,397	$ 1,543	28.6 %
Percentage of total revenue	86.5 %	48.5 %		

Sales and marketing expenses increased by $1.5 million, or 28.6%. This increase was due to employee-related costs of $2.3 million related to the expansion of our marketing organizations to support increased commercial and marketing activities and an increase of $0.4 million in facilities and information technology related costs to support increased headcount. Partially offsetting the increase was a reduction in consulting fees of $1.2 million due to bringing some marketing activities in-house and a reduction in one-time marketing activities and studies performed during the six months ended June 30, 2021.

General and administrative

	Six Months Ended June 30,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
General and administrative	$ 12,498	$ 6,827	$ 5,671	83.1 %
Percentage of total revenue	155.8 %	61.4 %		

General and administrative expenses increased by $5.7 million, or 83.1%. This increase was primarily due to a $2.7 million increase in employee-related costs driven primarily by higher headcount, a $1.6 million increase related to public company business insurance and compensation of the non-employee members of our board of directors. Also contributing to the cost increase was an increase in rent and depreciation expense of $0.8 million due to the addition of our Lexington facility and related depreciation of leasehold improvements as well as increased software costs due to a new enterprise resource planning (ERP) implementation at the end of 2021. The remainder of the increase was attributable to a net increase of $0.6 million in other general and administrative expenses.

Other income (expense)

Interest expense

Interest expense for the six months ended June 30, 2022 and 2021 was less than $0.1 million and $1.9 million, respectively. The decrease of $1.8 million, or 98.9%, was due to the repayment of our 2020 Term Loan in September 2021.

Change in fair value of preferred stock warrant liability

The change in fair value of preferred stock warrant liability was zero for the six months ended June 30, 2022 compared to a loss of $11.5 million for the six months ended June 30, 2021. The change was due primarily to an increase in the fair value of the underlying preferred stock used to determine the value of preferred stock warrants.

Other income (expense)

Other income increased by $0.5 million. The increase was primarily due to an increase in investment activity resulting in interest income.

Income tax (benefit) expense

Income tax (benefit) expense was a benefit of $0.6 million for the six months ended June 30, 2022 compared to $37 thousand for the six months ended June 30, 2021. The expense was recorded for our German subsidiary. During the six months ended June 30, 2022, we adjusted our uncertain tax liability as a result of the outcome of the tax examination for our German subsidiary for the tax years 2016 through 2018, resulting in favorable income tax expense for the period.

Liquidity and capital resources

Since our inception, we have incurred significant operating losses. To date, we have funded our operations primarily through proceeds from sales of redeemable convertible preferred stock, borrowing under loan agreements, revenue from sales of our products, services and contracts and proceeds from our IPO.

On August 11, 2022, our Board of Directors approved the Restructuring Plan to right-size our cost structure based on our lowered 2022 outlook. We will continue to invest in key growth initiatives including enhanced commercial capabilities and key product development programs that are expected to drive future revenue growth. We expect to record a restructuring charge of approximately $1.5 million in the third quarter of 2022 primarily related to severance, employee benefits, outplacement and related costs under the Restructuring Plan. We expect the Restructuring Plan to result in approximately $8.0 - $9.0 million in annualized cost savings by the first quarter of 2023.

We believe that our cash, cash equivalents and short- and long-term investments will enable us to fund our operating expenses and capital expenditure requirements for at least twelve months following the date the condensed consolidated financial statements contained in this Quarterly Report on Form 10-Q for the quarter ended June 30, 2022, were issued.

As of June 30, 2022, we had the following cash and investment-related assets on our condensed consolidated balance sheet (in thousands):

		June 30, 2022
Cash and cash equivalents	$	49,720
Short-term investments		94,371
Long-term investments		22,816
Restricted cash		284
Total	$	167,191

Contractual obligations and commitments

In March 2022, we amended the lease for our office and manufacturing space in Lowell, Massachusetts, or the Amendment. The Amendment increased the amount of facility space subject to the lease and extended the expiration of the lease from July 2026 to July 2029. The terms of the Amendment include options for a one-time, five-year extension of the lease and early termination of the lease in July 2026 (subject to an early termination fee), as well as a $0.3 million tenant improvement allowance. Monthly rent payments are fixed and future minimum lease payments under the lease (as amended) are $4.6 million.

Cash flows

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

	Six Months Ended June 30, 2022	Six Months Ended June 30, 2021
Net cash used in operating activities	$ (31,787)	$ (22,768)
Net cash (used) provided by investing activities	(97,335)	14,228
Net cash provided by financing activities	455	78,692
Net (decrease) increase in cash and cash equivalents and restricted cash	$ (128,667)	$ 70,152

Operating activities

During the six months ended June 30, 2022, operating activities used $31.8 million in cash, primarily resulting from our net loss of $28.0 million, net cash used by changes in our operating assets and liabilities of $7.7 million, which were partially offset by non-cash charges of $4.0 million. Net cash used by changes in our operating assets and liabilities for the six months ended June 30, 2022 consisted of an increase in inventory of $5.7 million driven by an increase in finished goods and raw material inventory, as well as a decrease in accounts payable of $1.1 million and a decrease in accrued expenses and other current liabilities of $4.5 million. The cash used by operating assets and liabilities was partially offset by a decrease in prepaid and other assets of $2.0 million driven by amortization, a decrease in accounts receivable of $0.9 million, and an increase in deferred revenue of $0.6 million.

During the six months ended June 30, 2021, operating activities used $22.8 million in cash, primarily resulting from our net loss of $33.9 million, net cash used by changes in our operating assets and liabilities of $1.9 million, which were partially offset by non-cash charges of $13.1 million, which include the non-cash change in fair value of preferred stock warrant liability of $11.5 million. Net cash used by changes in our operating assets and liabilities for the six months ended June 30, 2021 consisted primarily of increases in inventory of $3.0 million driven by an increase in finished goods and raw material inventory to support increased production volume and build safety stock, as well as a decrease in accounts payable of $1.9 million and deferred rent of $0.1 million. The cash used by operating assets and liabilities is partially offset by a decrease in accounts receivable of $1.9 million, an increase in accrued expenses of $1.4 million, and an increase in deferred revenue and long term deferred rent of $0.1 million.

Investing activities

During the six months ended June 30, 2022, net cash used in investing activities was $97.3 million, due to purchases of investments of $118.0 million and purchases of property and equipment of $4.3 million, partially offset by maturities of investments of $25.0 million. The net cash used to purchase short- and long-term investments was the single largest contributor to our decrease in cash and cash equivalents and restricted cash for the six months ended June 30, 2022.

During the six months ended June 30, 2021, net cash provided by investing activities was $14.2 million, consisting of purchase of property and equipment of $0.8 million, and maturities of investments of $15.0 million.

Financing activities

During the six months ended June 30, 2022, net cash provided by financing activities was $0.5 million, primarily from Class A common stock issued upon stock option exercises.

During the six months ended June 30, 2021, net cash provided by financing activities was $78.7 million, consisting primarily of net proceeds of $79.7 million from the issuance of convertible preferred stock and $0.8 million in proceeds from restricted common stock purchased by an employee and stock option exercises, partially offset by $1.9 million cash paid for deferred offering costs.

Seasonality

Our revenues vary from quarter to quarter as a result of factors such as our customers' budgetary cycles and extended summer vacation periods that could impact our ability to deliver products and provide onsite services to our customers during those periods. We expect this volatility to continue for the foreseeable future, which may cause fluctuations in our operating results and financial metrics. In addition, trends may vary in the future as our revenue mix shifts from non-recurring to recurring revenues.

Critical accounting estimates

Our condensed consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States. The preparation of our consolidated financial statements and related disclosures requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, costs and expenses, and the disclosure of contingent assets and liabilities in our consolidated financial statements. Our estimates are based on our historical experience, known trends and events and various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. We evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions or conditions.

Our significant accounting policies are described in more detail in Note 2 — Summary of Significant Accounting Policies to our condensed consolidated financial statements included elsewhere in this Quarterly Report on Form 10-Q. There have been no significant changes in our critical accounting policies and estimates as compared to the critical accounting policies and estimates disclosed in the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in the 2021 Form 10-K, other than as disclosed in Note 2.

Recently issued accounting pronouncements

A description of recently issued accounting pronouncements that may potentially impact our financial position, results of operations or cash flows is disclosed in Note 2 — Summary of Significant Accounting Policies 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, or the JOBS Act, 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 to use this extended transition period for complying with new or revised accounting standards that have different effective dates for public and private companies until the earlier of the date we (i) are no longer an emerging growth company or (ii) affirmatively and irrevocably opt out of the extended transition period provided in the JOBS Act. As a result, we will not be subject to the same new or revised accounting standards as other public companies that are not emerging growth companies, and our financial statements may not be comparable to other public companies that comply with new or revised accounting pronouncements as of public company effective dates. We may choose to early adopt any new or revised accounting standards whenever such early adoption is permitted for private companies.

We will cease to be an emerging growth company on the date that is the earliest of (i) the last day of the fiscal year in which we have total annual gross revenues of $1.07 billion or more, (ii) the last day of our fiscal year following the fifth anniversary of the date of the closing of the IPO, (iii) the date on which we have issued more than $1.0 billion in nonconvertible debt during the previous three years or (iv) the date on which we are deemed to be a large accelerated filer under the rules of the Securities and Exchange Commission.

Further, even after we no longer qualify as an emerging growth company, we may still qualify as a "smaller reporting company," which would allow us to take advantage of many of the same exemptions from disclosure requirements, including reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements. We cannot predict if investors will find our common shares less attractive because we may rely on these exemptions. If some investors find our common shares less attractive as a result, there may be a less active trading market for our common shares and our share price may be more volatile.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to market risk in the ordinary course of our business. Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. Our market risk exposure is primarily a result of fluctuations in interest rates and inflationary pressure. There has been no material change in our exposure to market risks from that discussed in Part II, Item 7A, "Quantitative and Qualitative Disclosures About Market Risk" of the 2021 Form 10-K.

Item 4. Controls and Procedures

Limitations on effectiveness of controls and procedures

In designing and evaluating our disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs.

Evaluation of disclosure controls and procedures

Our management, with the participation of our principal executive officer and principal financial officer, evaluated, as of the end of the period covered by this Quarterly Report on Form 10-Q, the effectiveness of our 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). Based on that evaluation, our principal executive officer and principal financial officer concluded that, as of June 30, 2022, 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, 2022 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

From time to time, we may become involved in litigation or other legal proceedings. We are not currently a party to any litigation or legal proceedings that, in the opinion of our management, are probable to have a material adverse effect on our business. Regardless of outcome, litigation can have an adverse impact on our business, financial condition, results of operations and prospects because of defense and settlement costs, diversion of management resources and other factors.

Item 1A. Risk Factors

Investing in our common stock involves a high degree of risk. Information regarding risk factors appears in Part I, Item 1A of our 2021 Form 10-K. Aside from the below, there have been no material changes from the risk factors previously disclosed in the 2021 Form 10-K.

Risks Related to Our Financial Position and Need for Capital

Our operating results have fluctuated significantly in the past and will fluctuate significantly in the future, which makes our future operating results difficult to predict and could cause our operating results to fall below expectations.

Our quarterly and annual operating results have fluctuated significantly in the past and may fluctuate significantly in the future, which makes it difficult for us to predict our future operating results. These fluctuations may occur due to a variety of factors, many of which are outside of our control, including, but not limited to:

- our customers' tendency to purchase our Growth Direct system, including multiple systems, in a single transaction, resulting in significant variations in sales of our systems over time;
- the level of demand for our platform and solutions, which may vary significantly;
- the length of time of the sales cycle for purchases of our systems;
- seasonality in our business due to our customers' budgetary cycles and time off during the summer vacation;
- lead time needed for validation prior to our customers' using and purchasing our consumables;
- changes in demand for our consumables;
- the timing and cost of, and level of investment in, technology development and commercialization activities, which may change from time to time;
- the start and completion of manufacturing runs;
- system repairs or replacements that may impact our customers' confidence in us and our products and our reputation in the market;
- the relative reliability and robustness of our platform;
- the introduction of new products or product enhancements by us or others in our industry;
- expenditures that we may incur to acquire, develop or commercialize additional products and technologies;

- expenditures involved in preparing, filing, prosecuting, maintaining, defending and enforcing patent claims;
- future accounting pronouncements or changes in our accounting policies;
- the ability of our sales organization to design and execute effective sales processes; and
- general market conditions and other factors, including factors, such as inflation, unrelated to our operating performance or the operating performance of our competitors.

For example, we experienced a decrease in our installation of Growth Direct systems in 2020 due to the shutdown of a number of our customers due to the COVID-19 pandemic and the rapid onset of the Omicron variant impacted system placements in the second half of the fourth quarter of 2021. During the beginning of 2022, we continued to experience customer site access limitations and delayed systems placement timelines that impacted our ability to sell and validate our systems with new customers and place additional systems with our existing customers. The effect of one of the factors discussed above, or the cumulative effects of a combination of factors discussed above, 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. We may continue to experience fluctuations in our operating results as a result of these factors.

We may fail to meet our publicly announced guidance or other expectations about our business and future operating results, which could adversely affect our business, reputation and financial results and cause our stock price to decline.

From time to time, we release earnings guidance in our quarterly and annual earnings conference calls, quarterly and annual earnings releases, or otherwise, regarding our future performance that represents our management's estimates as of the date of release. This guidance includes forward-looking statements based on projections prepared by our management. Projections are based upon a number of assumptions and estimates that are based on information known when they are issued, and, while presented with numerical specificity, are inherently subject to significant business, economic, and competitive uncertainties and contingencies relating to our business, many of which are beyond our control and are based upon specific assumptions with respect to future business decisions, some of which will change. Some of those key assumptions include our customers' demand for our Growth Direct systems, the length of the sales cycle for purchases of our systems, customer site readiness, the lead time needed for validation of our systems prior to customers using and purchasing our consumables, the timing and impact of the COVID-19 pandemic and the onset of variants, and broader macro-economic uncertainty. These assumptions are inherently difficult to predict. It can be expected that some or all of the assumptions underlying any guidance furnished by us will not materialize or will vary significantly from actual results. From time to time, we provide possible outcomes as high and low ranges, but these are not intended to imply that actual results could not fall outside of the suggested ranges.

Our actual business results may vary significantly from such guidance due to a number of factors, many of which are outside of our control, including our customers' demand for our Growth Direct systems, the length of the sales cycle for purchases of our systems, customer site readiness and the lead time needed for validation of our systems prior to customers using and purchasing our consumables, as well as the impact of global economic uncertainty and financial market conditions , geopolitical events, such as the conflict in Ukraine, rising inflation, rising interest rates, and the COVID-19 pandemic, all of which could adversely affect our business and future operating results. There are no comparable recent events that provide insights on the probable effects of the COVID-19 pandemic and current macro-economic uncertainty, and, as a result, the ultimate impacts of the COVID-19 pandemic and/or the current macro-economic environment are highly uncertain and subject to change. Furthermore, if we make downward revisions of our previously announced guidance, or if our publicly announced guidance of future operating results fails to meet expectations of securities analysts, investors, or other interested parties, we may experience adverse effects on our business and reputation and the price of our common stock could decline.

In January 2022 we announced that our actual commercial revenue for the fiscal year ended December 31, 2021 was below our previous guidance, and in August 2022, we announced a downward revision in our commercial revenue guidance for the fiscal year ended December 31, 2022. Given the uncertainty surrounding our ability to design and execute more effective sales processes, generate and convert sufficient sales leads with new customers and place additional systems with existing customers, we may continue to fail to meet our publicly announced guidance in the future. Guidance is necessarily speculative in nature, and it can be expected that some or all of the assumptions underlying the guidance furnished by us will not materialize or will vary significantly from actual results. Accordingly, our guidance is only an estimate of what management believes is realizable as of the date of release. Actual results may vary from our guidance and the variations may be material. In light of the foregoing, investors are urged not to rely upon our guidance in making an investment decision regarding our common stock. Any failure to successfully implement our business strategy or the occurrence of any of the events or circumstances set forth in this Risk Factors section in this report could result in the actual operating results being different from our guidance, and the differences may be adverse and material.

Risks Related to Our Business and Strategy

The ongoing COVID-19 pandemic has impacted, and may continue to impact, our operations and may materially and adversely affect our business and financial results.

Since late 2019, the COVID-19 pandemic has spread globally, including to the Boston, Massachusetts area, where our primary offices and manufacturing facility are located. The COVID-19 pandemic continues to evolve, and has led to the implementation of various responses, including government-imposed, shelter-in-place orders, quarantines, travel restrictions and other public health safety measures. In response to the spread of COVID-19, and its variants, and in accordance with direction from state and local government authorities, we have restricted access to our facilities mostly to personnel and third parties who must perform critical activities that must be completed on-site, limited the number of such personnel that can be present at our facilities at any one time, and requested that most of our personnel work remotely. In the event that government authorities modify current restrictions, our employees conducting development or manufacturing activities may not be able to access our manufacturing space, and our core activities may be significantly limited or curtailed, possibly for an extended period of time.

As a result of the ongoing COVID-19 pandemic, we have and may in the future experience severe disruptions, including:

- interruption of or delays in receiving products and supplies from the third parties we rely on to, among other things, manufacture components for our Growth Direct system and consumables, due to staffing shortages, production slowdowns or stoppages and disruptions in delivery systems, which may impair our ability to sell our products;
- limitations on our business operations by local, state, or the federal government that could impact our ability to sell our products;
- on-site visit limitations and prohibitions imposed by customers that could impact our ability to engage in pre-sales activities, such as in-person meetings and site visits, and to provide post-sale activities, such as installation and validation, training and service and support;
- delays in customers' purchasing decisions and negotiations with existing and potential customers;
- business disruptions caused by workplace, laboratory and office closures and an increased reliance on employees working from home, travel limitations, cyber security and data accessibility, or communication or mass transit disruptions; and
- limitations on employee resources that would otherwise be focused on the conduct of our activities, including because of sickness of employees or their families or the desire of employees to avoid contact with large groups of people.

Any of these factors could severely impact our development activities, business operations and sales, or delay necessary interactions with manufacturing sites and other important contractors and customers. For example, we experienced a disruption in receiving supplies from third parties and a decrease in installations as a result of the shutdown of our customers' businesses. In addition, our sales and service processes have been significantly disrupted by our customers' COVID-related restrictions and staffing shortages, which have impacted our customer site access and delayed systems placement timelines. These and other factors arising from the COVID-19 pandemic could worsen in countries that are already afflicted with COVID-19, and its variants, could continue to spread, or could return to countries where the pandemic has been partially contained, and could further adversely impact our ability to conduct our business generally and have a material adverse impact on our operations and financial condition and results.

The extent to which the outbreak may negatively impact our operations and results of operations or those of our third party manufacturers, suppliers, collaborators or customers will depend on future developments, which are highly uncertain and cannot be predicted with confidence, such as the ultimate duration of the pandemic, subsequent waves of infection or variant strains, including the impact of the Delta and Omicron variants, the timing, availability, and effectiveness of vaccines as well as vaccination rates among the population, travel restrictions, and additional or modified government actions and private sector actions to contain the spread of COVID-19 or treat its impact, such as social distancing, quarantines, lock-downs or business closures.

We have limited experience in marketing and sales, and if we are unable to improve the effectiveness of our marketing and sales organization to adequately expand our business with new and existing customers and address our customers' needs, our business may be adversely affected.

We have limited experience in marketing and selling our products and we currently rely on a small team to make direct sales in countries around the world. There are significant risks involved with relying on our own marketing and sales capabilities, including our ability to design and execute effective sales processes, generate and convert sufficient sales opportunities into new customers and place additional systems with existing customers. For example, in October 2021, we hired a new sales leader who implemented new sales processes which did not generate the system placements we anticipated. We are implementing improved sales processes, and there can be no assurance that those efforts will be successful.

Furthermore, in order to support our growth, we will need to increase our sales and marketing team. Competition for employees capable of selling expensive instruments within the drug manufacturing industry is intense. There are significant expenses and risks involved with having our own sales and marketing team, including our ability to hire, train, retain, and appropriately incentivize a sufficient number of qualified individuals, generate sufficient sales leads and provide our sales and marketing team with adequate access to customers who may want to purchase our products, effectively manage a geographically dispersed sales and marketing team, and other unforeseen costs and expenses. We may not be able to attract and retain personnel or be able to build an efficient and effective sales organization, which could negatively impact sales and market acceptance of our products and limit our revenue growth and potential profitability. In addition, the time and cost of establishing a specialized sales, marketing and service force for a particular product or service may be difficult to justify in light of the revenue generated or projected. Our sales processes may also be disrupted by our announced organizational restructuring plan and plans to explore strategic alternatives.

We may also choose to engage distributors for the sale of our products. We would exert limited control over these distributors, and if their sales and marketing efforts for our products are not successful, our business would be materially and adversely affected. We may not be successful in locating, qualifying and engaging distributors with local industry experience and knowledge, or we may not be able to enter into arrangements with them on favorable terms. Even if we are successful in identifying distributors, such distributors may engage in sales practices that violate local laws or our internal policies. Furthermore, sales practices utilized by any such distributors that are locally acceptable may not comply with sales practices standards required under U.S. laws that apply to us, which could create additional compliance risk.

Any of these issues could impair our ability to successfully place our Growth Direct systems and meet our revenue expectations. If we are unable to improve our sales processes and expand our marketing and sales organization, whether independently or with third parties, then our business, financial condition, results of operations and prospects will be materially adversely affected.

Our organizational restructuring plan, including a reduction in workforce, announced in August 2022, may not result in anticipated savings, could result in total costs and expenses that are greater than expected and could disrupt our business.

On August 12, 2022, we announced an approximately 20% reduction in our workforce, including employees, contractors and temporary employees, in connection with an organizational restructuring plan. We may not realize, in full or in part, the anticipated benefits and cost savings from our cost reduction efforts due to unforeseen difficulties, delays or unexpected costs. If we are unable to realize the expected operational efficiencies, improved commercial execution and cost savings from the restructuring, our operating results and financial condition could be adversely affected. If future results of operations lag our expectations, we may undertake additional workforce reductions or restructuring activities.

Our restructuring and any additional measures we might take to reduce costs could divert the attention of management, yield attrition beyond our intended reduction in workforce, reduce employee morale, or cause us to delay, limit, reduce or eliminate certain product development plans, each of which could have an adverse impact on our business, operating results and financial condition. This organizational restructuring plan may also reduce our existing customers' confidence in us, disrupt our sales initiatives for new system placements, and negatively impact our customer service operations. Our failure to adequately address any of these issues could have a material adverse effect on our business, operating results and financial condition.

The Growth Direct platform may contain undetected errors or defects and may not meet the expectations of our customers, which means our business, financial condition, results of operations and prospects could suffer.

Our Growth Direct platform includes the Growth Direct system, proprietary consumables and our LIMS connection software. While we rigorously test our platform and its components, there could be undetected errors or defects. Disruptions or other performance problems with our platform or with the components that comprise our platform may adversely impact our customers' manufacturing process, compliance workflow or business, harm our reputation and result in reduced revenue or increased costs associated with repairs or replacements. If that occurs, we may also incur significant costs, the attention of our key personnel could be diverted, or other significant customer relations problems may arise. We may also be subject to warranty claims or breach of contract for damages related to errors or defects in our products. Additionally, we may be subject to legal claims arising from any defects or errors in our platform, and in the systems, consumables and software that comprise our platform. In the past, we have repaired, and in exceptional cases, replaced Growth Direct systems under warranty. Our failure to adequately address any of foregoing risks related to errors or defects with our platform could have a material adverse effect on our business, operating results and financial condition.

Our success depends on, among other things, the market's confidence that the Growth Direct platform is capable of substantially enhancing quality control in the conduct of manufacturing activities as compared to the traditional method of MQC testing and will enable more efficient or improved drug manufacturing. Pharmaceutical companies and contract manufacturing organizations, or CMOs, are likely to be particularly sensitive to defects and errors in the use of our platform, including if our platform fails to deliver meaningful improvements in MQC testing with results at least as good as the results generated using the traditional method of MQC testing. There can be no guarantee that our platform will meet the expectations of these companies or CMOs.

The complexity of our products and the amount of lead time required to deliver products to our customers have caused in the past, and may cause in the future, delays in releasing new products and workflows. In addition, we have experienced in the past, and may experience in the future, challenges with respect to the reliability of our systems. If there are delays in delivering our products to our customers, or if our products fail to perform as well as or better than traditional MQC testing or fail to generate reliable results for our customers, our revenue could be reduced or delayed, which could adversely affect our business, financial condition, results of operations and prospects.

These complexities also require that we train our customers to operate our Growth Direct platform, which is expensive and time consuming. Any misuse of our products, including as a result of inadequate training, could cause our products not to perform as expected or to fail to demonstrate the process advantages of our products. The training requirement may also deter some customers from utilizing our products. Any of these results could adversely affect our business, financial condition, results of operations and prospects.

If we lose key management, cannot recruit qualified employees, directors, officers or other significant personnel or experience increases in our compensation costs, our business may be materially harmed.

We are highly dependent on our management and directors, including our Chief Executive Officer, Robert Spignesi, among others. Due to the specialized knowledge each of our officers and key employees possesses with respect to our products and services and our operations, the loss of service of any of our officers or directors could delay or prevent the successful sales and expansion of our platform. We do not carry key person life insurance on our Chief Executive Officer or our other officers or directors. In general, the employment arrangements that we have with our executive officers do not prevent them from terminating their employment with us at any time.

In addition, our future success and growth will depend in part on the continued service of our directors, employees and management personnel and our ability to identify, hire and retain additional personnel. If we lose one or more of our executive officers or key employees, our ability to implement our business strategy successfully could be seriously harmed. Furthermore, replacing executive officers and key employees may be difficult or costly and may take an extended period of time because of the limited number of individuals in our industry with the breadth of skills and experience required to develop, market and sell our products successfully. Competition to hire from this limited pool is intense, and we may be unable to hire, train, retain or effectively incentivize these additional key personnel on acceptable terms given the competition among numerous technology companies for similar personnel. In addition, we rely on consultants and advisors to assist us in formulating our development and commercialization strategy. Our consultants and advisors may be engaged by entities other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us.

In August 2022, we implemented our organizational restructuring plan to reduce our operating expenses. In addition, we announced plans to explore strategic alternatives. These actions, and any future related actions or announcements, may make it increasingly difficult for us to hire and retain our executive officers, key employees, consultants and advisors. If we are unable to attract qualified personnel and retain our current employees, our ability to develop and sell our products could be limited and our business and customer relationships could be materially harmed.

Risks Related to Our Common Stock

Provisions in our restated certificate of incorporation and amended and restated bylaws and under Delaware law could make an acquisition of our company, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our restated certificate of incorporation and our amended and restated bylaws may discourage, delay or prevent a merger, acquisition or other change in control of our company that stockholders may consider favorable, including transactions in which our stockholders might otherwise receive a premium for their shares. These provisions could also limit the price that investors might be willing to pay in the future for shares of our Class A common stock, thereby depressing the market price of our Class A common stock. In addition, because our board of directors is responsible for appointing the members of our management team, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. Among other things, these provisions include those establishing:

- a classified board of directors with three-year staggered terms, which may delay the ability of stockholders to change the membership of a majority of our board of directors;

- no cumulative voting in the election of directors, which limits the ability of minority stockholders to elect director candidates;
- the exclusive right of our board of directors to elect a director to fill a vacancy created by the expansion of the board of directors or the resignation, death or removal of a director, which prevents stockholders from filling vacancies on our board of directors;
- the ability of our board of directors to authorize the issuance of shares of preferred stock and to determine the terms of those shares, including preferences and voting rights, without stockholder approval, which could be used to significantly dilute the ownership of a hostile acquirer;
- the ability of our board of directors to alter our bylaws without obtaining stockholder approval;
- the required approval of the holders of at least two-thirds of the shares entitled to vote at an election of directors to adopt, amend or repeal our bylaws or repeal the provisions of our restated certificate of incorporation regarding the election and removal of directors;
- the required approval of the holders of at least two-thirds of the shares entitled to vote thereon to (i) effect a reorganization, recapitalization, share exchange, share classification, consolidation, conversion or merger, (ii) sell, lease, exchange, transfer or otherwise dispose of all or substantially all of our assets, or (iii) dissolve our company or revoke a dissolution of our company;
- a prohibition on stockholder action by written consent, which forces stockholder action to be taken at an annual or special meeting of our stockholders;
- the requirement that a special meeting of stockholders may be called only by the chairman of the board of directors, the chief executive officer, the president or the board of directors, which may delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors; and
- advance notice procedures that stockholders must comply with in order to nominate candidates to our board of directors or to propose matters to be acted upon at a stockholders' meeting, which may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of us.

In addition, on August 11, 2022, we adopted a stockholder rights agreement that could discourage potential acquisition proposals and could delay or prevent a change in control of the Company or a change in our management or board of directors, even in situations that may be considered beneficial by some of our shareholders.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the General Corporation Law of the State of Delaware, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner.

Our Rights Agreement could make it more difficult for a third party to acquire control of the Company, which could have a negative effect on the price of our common stock.

On August 11, 2022, we adopted a stockholder rights agreement (the "Rights Agreement") that could discourage potential acquisition proposals and could delay or prevent a change in control of the Company or a change in our management or board of directors, even in situations that may be considered beneficial by some of our stockholders. The Rights Agreement may substantially dilute the stock ownership of a person or group that attempts to acquire a large interest. These deterrents could also adversely affect the price of our Class A common stock. The Rights Agreement will automatically expire on the day after our 2023 Annual Meeting of Stockholders (the "2023 Annual Meeting"), unless approved by our stockholders at the 2023 Annual Meeting, in which case it will expire in one year, on August 11, 2023.

Our process of exploring strategic alternatives may not result in a strategic transaction.

On August 12, 2022, we announced our board of directors' decision to reject an unsolicited, non-binding proposal we received from Kennedy Lewis Investment Management LLC to acquire the entire company for $5.00 per share in cash and the commencement of a process to review strategic alternatives. Our board of directors will review and consider a full range of possible alternatives, including, among other things, a possible sale, merger, strategic partnership or refinancing. We currently have no commitments or agreements with respect to any particular transaction, and there can be no assurance that our review of strategic alternatives will result in any strategic transaction. If our board of directors decides to proceed with a strategic transaction, it may not be at a price that our investors view as attractive relative to the value of our standalone strategic plan. Additionally, the closing of any such transaction would be dependent upon a number of factors that may be beyond our control, including, among other factors, market conditions, regulatory factors, industry trends, the interest of third parties in our business and the availability of financing to potential buyers on reasonable terms. If our board of directors decides not to proceed with a strategic transaction, this could have a negative effect on the market price and volatility of our common stock. In either case, we may incur substantial expenses associated with identifying and evaluating potential strategic transactions, the process may be time consuming and disruptive to our business, and we may be subject to costly and time-consuming litigation regarding our board of directors' decision to proceed or not to proceed with a strategic transaction. Speculation and uncertainty regarding this process, including other actions taken by third parties, regardless of whether we are able to complete a strategic transaction, may also have a negative effect on:

- the market price and volatility of our Class A common stock;
- customer confidence in our business, products and services;
- our existing and potential future relationships with suppliers; and
- our ability to attract and retain key personnel who are necessary to the operation of the business, marketing and sales of our systems, and development of additional products.

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

Recent Sales of Unregistered Securities; Purchases of Equity Securities by the Issuer or Affiliated Purchaser

None.

Use of Proceeds

On July 14, 2021, the Registration Statement on Form S-1 (File No. 333-257431) relating to our IPO was declared effective by the SEC. There has been no material change in the expected use of the net proceeds from our IPO as described in our final prospectus.

Item 3. Defaults Upon Senior Securities

None.

Item 4. Mine Safety Disclosures

Not applicable.

Item 5. Other Information

Not applicable.

Item 6. Exhibits

Exhibit Number	Exhibit Description	Incorporated by Reference				Filed/ Furnished Herewith
		Form	File No.	Exhibit	Filing Date	
3.1	Restated Certificate of Incorporation	8-K	001-40592	3.1	7/21/2021	
3.2	Amended and Restated Bylaws	8-K	001-40592	3.2	7/21/2021	
3.3	Certificate of Designations of Series A Junior Participating Cumulative Preferred Stock of Rapid Micro Biosystems, Inc. classifying and designating the Series A Junior Participating Cumulative Preferred Stock	8-A	001-40592	3.1	8/12/2022	
3.4	Certificate of Designations of Series B Junior Participating Cumulative Preferred Stock of Rapid Micro Biosystems, Inc. classifying and designating the Series B Junior Participating Cumulative Preferred Stock	8-A	001-40592	3.2	8/12/2022	
4.1	Stockholder Rights Agreement, dated as of August 11, 2022, between Rapid Micro Biosystems, Inc. and Computershare Trust Company, N.A., as Rights Agent	8-A	001-40592	4.1	8/12/2022	
31.1	Certification of Chief Executive Officer pursuant to Rule 13a-14(a)/15d-14(a).					*
31.2	Certification of Chief Financial Officer pursuant to Rule 13a-14(a)/15d-14(a).					*
32.1	Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350.					**
32.2	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350.					**
101.INS	Inline XBRL Instance Document – the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.					*
101.SCH	Inline XBRL Taxonomy Extension Schema Document.					*
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document.					*
101.DEF	Inline XBRL Taxonomy 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.
**	Furnished herewith.

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, duly authorized.

Date: August 12, 2022

RAPID MICRO BIOSYSTEMS, INC.

By: /s/ Robert Spignesi
Robert Spignesi
President and Chief Executive Officer
(Principal Executive Officer)

By: /s/ Sean Wirtjes
Sean Wirtjes
Chief Financial Officer
(Principal Financial Officer and Principal Accounting Officer)

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
PURSUANT TO RULES 13a-14(a) OR 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Robert Spignesi, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Rapid Micro Biosystems, Inc.;

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

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

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) 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) (Paragraph omitted pursuant to SEC Release Nos. 33-8238/34-47986 and 33-8392/34-49313);

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

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

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

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

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

Date: August 12, 2022

By:	/s/ Robert Spignesi
Name:	Robert Spignesi
Title:	Chief Executive Officer (principal executive officer)

Exhibit 31.2

**CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER
PURSUANT TO RULES 13a-14(a) OR 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Sean Wirtjes, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Rapid Micro Biosystems, Inc.;

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

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

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) 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) (Paragraph omitted pursuant to SEC Release Nos. 33-8238/34-47986 and 33-8392/34-49313);

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

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

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

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

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

Date: August 12, 2022

By:	/s/ Sean Wirtjes
Name:	Sean Wirtjes
Title:	Chief Financial Officer *(principal financial officer and principal accounting officer)*

Exhibit 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

In connection with the quarterly report of Rapid Micro Biosystems, Inc. (the "Company") on Form 10-Q for the period ended June 30, 2022 (the "Report"), as filed with the Securities and Exchange Commission on the date hereof, I, the undersigned, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, to the best of my knowledge, that:

(1) The Report fully complies with the requirements of Section 13(a) or Section 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 12, 2022

By: /s/ Robert Spignesi
Name: Robert Spignesi
Title: Chief Executive Officer
(principal executive officer)

Exhibit 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

In connection with the quarterly report of Rapid Micro Biosystems, Inc. (the “Company”) on Form 10-Q for the period ended June 30, 2022 (the “Report”), as filed with the Securities and Exchange Commission on the date hereof, I, the undersigned, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, to the best of my knowledge, that:

(1) The Report fully complies with the requirements of Section 13(a) or Section 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 12, 2022

By: /s/ Sean Wirtjes
Name: Sean Wirtjes
Title: Chief Financial Officer
(principal financial officer and principal accounting officer)